

March 31, 2017

Director, Air Enforcement Division
Office of Civil Enforcement
U.S. Environmental Protection Agency
Mail Code 2242-A
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460-0001



Tesoro Refining & Marketing Company LLC
474 West 900 North
Salt Lake City, UT 84103
801 521 4810

CERTIFIED MAIL# 7016 0910 0000 1121 6313
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Subject: United States of America v. Tesoro Refining & Marketing Company LLC, et. al. in
the United States District Court, Western District of Texas, Civil No. SA-16-CV-
00722

Consent Decree Initial Flare Management Plan (Initial FMP)

Dear Sir or Madam:

In accordance with Paragraph 127 of the Consent Decree referenced above, Tesoro Refining & Marketing Company LLC and Tesoro Logistics LP submit the enclosed Initial FMP for their facilities located in Salt Lake City, UT.

Please contact Greg Busch of my staff at gregory.a.busch@tsocorp.com or 801-366-2063 if questions arise pertaining to this report.

Through this letter, Tesoro is asserting, pursuant to 40 C.F.R. § 2.203, a confidentiality claim covering the information provided by this enclosed Initial FMP. This confidentiality claim covers all information, including but not limited to, engineering drawings, plant diagrams, and other information contained within the Initial FMP. All of this information is trade secret, proprietary, or company confidential, and we would expect that EPA would not disclose this information to third parties, except as provided by 40 C.F.R. Part 2, Subpart B.

Sincerely,



Karma Thomson
VP, Salt Lake City Refinery

Enclosure – Initial FMP

Cc: Director, Air Enforcement Division
Office of Civil Enforcement
c/o Eastern Research Group, Inc.
14555 Avion Parkway, Suite 200
Chantilly, VA 20151-1124

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Director, Air and Toxics Technical Enforcement Program
Mail Code ENF-AT
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Denver, CO 80202-1129

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Ryan Soldat -- SAT

Jessica O'Brien -- SAT

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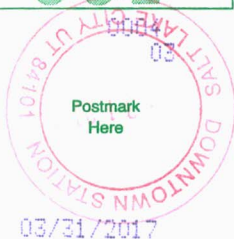
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Tesoro Refining & Marketing Company LLC

Salt Lake City Refinery

Consent Decree Initial Flare Management Plan

(Initial FMP)

April 1, 2017

Consent Decree Initial Flare Management Plan

April 1, 2017

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List of Acronyms

ACFM	Actual Cubic Feet per Minute
AGA	American Gas Association
ANSI	American National Standards Institute
API	American Petroleum Institute
CD	Consent Decree
CDFMP	Consent Decree Flare Management Plan
CPMS	Continuous Parameter Monitoring System
CT	Current Transformer
CV	Control Valve
EPA	United States Environmental Protection Agency
FCCU	Fluidized Catalytic Cracking Unit
FGRS	Flare Gas Recovery System
FMP	Flare Management Plan
GC	Gas Chromatograph
GE	General Electric
KO	Knock-Out
LPG	Liquefied Petroleum Gas
MMSCFD	Million Standard Cubic Feet per Day
MOC	Management of Change
P&ID	Piping and Instrumentation Diagram
PFD	Process Flow Diagram
PHA	Process Hazard Analysis
PRV	Pressure Relief Valve
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
RMP	Rocky Mountain Power
SOI	Standard Operating Instruction
SRU	Sulfur Recovery Unit
SSM	Startup, Shutdown, and Malfunction
Tesoro	Tesoro Refining & Marketing Company LLC
TGTU	Tail Gas Treating Unit
WGC	Wet Gas Compressor

Definitions

Terms used in this Flare Management Plan and the Tesoro Consent Decree are defined within the Consent Decree as:

30-day rolling average means the average daily emission rate or concentration during the preceding 30 Days that the unit(s) was operating.

Acid Gas means any gas that contains hydrogen sulfide and is generated at a Covered Refinery by the regeneration of an amine scrubber solution, but does not include Tail Gas.

Air-Assisted Flare means a Flare at any Covered Refinery that utilizes forced air piped to a Flare tip to assist in combustion; Air-Assisted Flares subject to the terms of the Consent Decree are set forth in Appendix C - 2.1 of the Consent Decree.

Assist Air or **Airasst** means all air that intentionally is introduced prior to or at a Flare tip through nozzles or other hardware conveyance for the purposes including, but not limited to, protecting the design of the Flare tip, promoting turbulence for mixing or inducing air into the flame. Assist Air includes Premix Assist Air and Perimeter Assist Air. Assist Air does not include the surrounding ambient air.

Assist Steam means all steam that intentionally is introduced prior to or at a Flare tip through nozzles or other hardware conveyance for the purposes including, but not limited to, protecting the design of the Flare tip, promoting turbulence for mixing or inducing air into the flame. Assist Steam includes, but is not necessarily limited to, Center Steam, Lower Steam, and Upper Steam.

Baseload Waste Gas Flow Rate means, for a particular Covered Flare, the daily average flow rate, in scfd, to the Flare, excluding all flows during periods of Startup, Shutdown, and Malfunction. The flow rate data period that shall be used to determine Baseload Waste Gas Flow Rate for the Covered Flares is set forth in Paragraph 127h.ii of the Consent Decree. The Baseload Waste Gas Flow Rate shall be identified in the Initial Flare Management Plan due under Paragraph 127 of the Consent Decree and may be updated in subsequent Flare Management Plans due under Paragraph 128 of the Consent Decree.

Block Average as it pertains to the Flaring Requirements in Section VI.B, shall have the meaning set forth in Appendix C - 1.15 of the Consent Decree.

Block Average Period or **Block Period**, as it pertains to the Flaring Requirements in Section VI.B, shall have the meaning set forth in Appendix C - 1.15 of the Consent Decree.

Center Steam means the portion of Assist Steam introduced into the stack of a Flare to reduce burnback. Diagrams illustrating the meaning and location of Center, Lower, and Upper Steam are set forth in Appendix C - 1.1 of the Consent Decree.

Combustion Zone means the area of the Flare flame where the Combustion Zone Gas combines for combustion.

Combustion Zone Gas means all gases and vapors found just after a Flare tip. This gas includes all Vent Gas, Total Steam, and Premix Assist Air.

Compressor means with respect to a FGRS, a mechanical device designed and installed to recover gas from a flare header. Types of FGRS compressors include reciprocating compressors, centrifugal compressors, liquid ring compressors, and liquid jet ejectors.

Consent Decree or **Decree** means the Consent Decree, including all appendices attached to the Consent Decree.

Covered Flare means a Flare listed in Appendix C - 2.1 of the Consent Decree.

Covered Refineries means the following facilities, each one of which is a Covered Refinery as that term is used herein:

Anacortes Refinery
10200 W March Point Rd.
Anacortes, WA 98221

Kapolei Refinery
91-325 Komohana St.
Kapolei, HI 96707

Kenai Refinery
54741 Tesoro Rd.
Kenai, AK 99611

Mandan Refinery
900 Old Red Trail NE
Mandan, ND 58554

Martinez Refinery including its Sulfuric Acid Plant
150 Solano Way
Martinez, CA 94553

Salt Lake City Refinery or "SLC Refinery"
474 West 900 North
Salt Lake City, UT 84103

Day or **Days** means a calendar day or days.

EPA or **U.S. EPA** means the United States Environmental Protection Agency and any successor departments or agencies of the United States.

FCCU as used herein means a fluidized catalytic cracking unit as that term is defined in 40 C.F.R. § 60.101a and any associated CO boiler(s) and waste heat boiler(s).

Flare means a combustion device lacking an enclosed combustion chamber that uses an uncontrolled volume of ambient air to burn gases. For the purposes of the Consent Decree, the definition of Flare includes, but is not necessarily limited to, Air-Assisted Flares, Steam-Assisted Flares and non-assisted Flares.

Flare Gas Recovery System or **FGRS** means a system of one or more Compressors, piping, and associated water seal, rupture disk, or similar device used to divert Potentially Recoverable Gas from a Flare and direct Potentially Recoverable Gas to a Fuel Gas System, to a combustion device other than the Flare, or to a product, co-product, by product, or raw material recovery system or other system that avoids combustion of the gases.

Fuel Gas shall have the meaning set out in 40 C.F.R. § 60.101a.

Fuel Gas System means the offsite and onsite piping and control system that gathers gaseous streams generated by refinery operations, may blend them with sources of gas, if available, and transports the blended gaseous fuel at suitable pressures for use as fuel in heaters, furnaces, boilers, incinerators, gas turbines, and other combustion devices located within or outside of the refinery. The fuel is piped directly to each individual combustion device, and the system typically operates at pressures over atmospheric. The gaseous streams can contain a mixture of methane, light hydrocarbons, hydrogen and other miscellaneous species.

Initial Flare Management Plan or **Initial FMP** means the document submitted pursuant to Paragraph 127 of the Consent Decree.

Lower Steam means the portion of Assist Steam piped to an exterior annular ring near the lower part of a Flare tip, which then flows through tubes to the Flare tip, and ultimately exits the tubes at the Flare tip. Diagrams illustrating the meaning and location of Center, Lower, and Upper Steam are set forth in Appendix C - 1.1 of the Consent Decree.

Malfunction "Malfunction" solely for the purposes of Requirements for Control of Flaring Events shall mean "any sudden, infrequent, and not reasonably preventable failure of air pollution control equipment, process equipment, or a process to operate in a normal or usual manner. Failures that are caused in part by poor maintenance or careless operation are not Malfunctions."

Minimum Total Steam Rate means the Total Steam Mass Flow Rate, in standard cubic feet per minute or in pounds per hour, recommended by the manufacturer of the Flare's tip at the time of Flare tip installation, or such lower Total Steam Mass Flow Rate as determined by the Flare tip manufacturer after Flare tip installation upon re-examination of the tip's requirements.

NSPS means the New Source Performance Standards codified at 40 C.F.R. Part 60.

Paragraph means a portion of the Consent Decree identified by an Arabic numeral, including subparts thereof identified by lower case English letters, small Roman numerals, and all of the above listed indicators in parentheses.

Perimeter Assist Air means the portion of Assist Air introduced at the perimeter of the Flare tip or above the Flare tip. Perimeter Assist Air includes air intentionally entrained in Lower and Upper Steam. Perimeter Assist Air includes all Assist Air except Premix Assist Air.

Pilot Gas means gas introduced into a Flare tip that provides a flame to ignite the Vent Gas.

Potentially Recoverable Gas means the Sweep Gas, Supplemental Gas introduced prior to a Covered Flare's water seal, and/or Waste Gas directed to a Covered Flare's FGRS or group of Covered Flares' FGRS. Purge Gas and Supplemental Gas introduced between a Covered Flare's water seal and a Covered Flare's tip is not Potentially Recoverable Gas. Hydrogen venting from the steam methane reformer (hydrogen plant) is not Potentially Recoverable Gas. Recycled hydrogen that bypasses the FGRS to reestablish hydrogen balance in the event that hydrogen demand declines or stops rapidly is also not Potentially Recoverable Gas. Excess Fuel Gas and excess gases generated during Shutdown, in turnaround, and during Startup, caused by a gas imbalance that cannot be consumed by Fuel Gas consumers in the refinery, because there is not sufficient demand for the gas, is not Potentially Recoverable Gas provided that when the excess gas is routed around the FGRS, no natural gas is being supplied to the Fuel Gas mix drum. Nitrogen purges of Flaring Process Units that are being Shutdown, in turnaround and during Startup, or the nitrogen purging of operating Flaring Process Units during a partial refinery turnaround scenario, that cause the NHV of the Fuel Gas at the exit of the mix drum to fall below 740 BTU/scf, shall not be considered Potentially Recoverable Gas, and may be routed around the FGRS.

ppm means parts per million.

Premix Assist Air means the portion of Assist Air that is introduced to the Vent Gas, whether injected or induced, prior to the Flare tip. Premix Assist Air also includes any air intentionally entrained in Center Steam.

Prevention Measure means an instrument, device, piece of equipment, system, process change, physical change to process equipment, procedure, or program to minimize or eliminate flaring.

Purge Gas means the minimum amount of gas introduced between a Flare header's water seal and the Flare tip necessary to prevent freezing and oxygen infiltration (backflow) into the Flare tip. For a Flare with no water seal, the function of Purge Gas is performed by Sweep Gas and, therefore, by definition, such a Flare has no Purge Gas.

Rolling Average, as it pertains to the Flaring Requirements in Section VI.B, shall have the meaning set forth in Appendix C - 1.15 of the Consent Decree.

SCFD or scfd means standard cubic feet per day.

SCFM or scfm means standard cubic feet per minute.

Section means a portion of the Consent Decree identified by a Roman numeral.

Shutdown means the cessation of operation of equipment for any purpose.

Startup means the setting into operation of equipment for any purpose.

Steam-Assisted Flare means a Flare that utilizes steam piped to a Flare tip to assist in combustion. Steam-Assisted Flares subject to the terms of the Consent Decree are set forth in Appendix C - 2.1 of the Consent Decree.

Sulfur Recovery Plant or **SRP** means the collection of Sulfur Recovery Units that are fed by one common Acid Gas feed line.

Sulfur Recovery Unit or **SRU** means a process unit that recovers sulfur from hydrogen sulfide by a vapor phase catalytic reaction of sulfur dioxide and hydrogen sulfide.

Supplemental Gas means all gas introduced to the Flare in order to improve the combustible characteristics of Combustion Zone Gas.

Sweep Gas means, for a Flare with a Flare Gas Recovery System, the minimum amount of gas necessary to maintain a constant flow of gas through the Flare header in order to prevent oxygen buildup, corrosion or freezing in the Flare tip or header; Sweep Gas in these Flares is introduced prior to and recovered by the Flare Gas Recovery System. Sweep Gas may be added to certain FGRS bypass lines that contain gas that is not Potentially Recoverable Gas. For a Flare without a Flare Gas Recovery System, Sweep Gas means the minimum amount of gas necessary to maintain a constant flow of gas through the Flare header in order to prevent oxygen buildup, corrosion or freezing in the Flare header or tip and to prevent oxygen infiltration (backflow) into the Flare tip.

Tail Gas means the exhaust gas from the Claus train(s) of a Sulfur Recovery Plant and/or from the tail gas unit.

Tesoro means each of the following Tesoro entities: Tesoro Refining & Marketing Company LLC and Tesoro Alaska Company LLC, including their successors in interest and assigns.

Tesoro Refineries means the Anacortes, Kenai, Mandan, Martinez, and Salt Lake City refineries listed above.

Total Steam or **S** means the total of all steam that is supplied to a Flare and includes, but is not limited to, Lower Steam, Center Steam and Upper Steam.

Total Steam Mass Flow Rate or \dot{m}_s means the mass flow rate of Total Steam supplied to a Flare. Total Steam Mass Flow Rate shall be calculated as set forth in Equation 3 in Appendix C - 1.2 of the Consent Decree.

United States means the United States of America, including the United States Department of Justice and the EPA.

Upper Steam, sometimes called Ring Steam, means the portion of Assist Steam introduced via nozzles located on the exterior perimeter of the upper end of the Flare tip. Diagrams illustrating the meaning and location of Center, Lower, and Upper Steam are set forth in Appendix C - 1.1 of the Consent Decree.

Vent Gas means all gas found just prior to the Flare tip. This gas includes all Waste Gas and that portion of Sweep Gas that is not recovered, Purge Gas and Supplemental Gas, but does not include Pilot Gas, Total Steam or Assist Air.

For the purposes of calculating S/VG only, "Vent Gas Mass Flow Rate" or $Q_{mass-rate}$ means the mass flow rate of Vent Gas directed to a Covered Flare. Vent Gas Mass Flow Rate shall be calculated as set forth in Equation 4 in Appendix C - 1.2 of the Consent Decree.

Vent Gas Volumetric Flow Rate or $Q_{vg-rate}$ means the volumetric flow rate of Vent Gas directed to a Covered Flare in wet scfm.

Waste Gas means the mixture of all gases from facility operations at a Covered Refinery that is directed to a Flare for the purpose of disposing of the gas. Waste Gas does not include gas introduced to a Flare exclusively to make it operate safely and as intended; therefore, Waste Gas does not include Pilot Gas, Total Steam, Assist Air, or the minimum amount of Sweep Gas and Purge Gas that is necessary to perform the functions of Sweep Gas and Purge Gas. Waste Gas also does not include gas introduced to a Flare to comply with regulatory requirements; therefore, Waste Gas does not include Supplemental Gas. Depending upon the instrumentation that measures Waste Gas, certain compounds (hydrogen, nitrogen, oxygen, carbon dioxide, carbon monoxide, and/or water (steam)) that are directed to a Flare for the purpose of disposing of these compounds may be excluded from calculations relating to Waste Gas flow; in the substantive provisions of this Section, the circumstances in which such exclusions are permitted are specifically identified. Appendix C - 1.7 of the Consent Decree depicts the meaning of Waste Gas, together with its relation to other gases associated with Flares.

1.0 Introduction

1.1 Purpose

Tesoro Refining & Marketing Company LLC (Tesoro) operates the Salt Lake City Refinery in Salt Lake City, Utah. The Salt Lake City Refinery is a Covered Refinery in the Consent Decree, Civ. No. SA-16-cv-00722, between the United States of America, the State of Alaska, the State of Hawaii, and the Northwest Clean Air Agency and Tesoro Refining & Marketing Company LLC, Tesoro Alaska Company LLC, Tesoro Logistics L.P., and Par Hawaii Refining LLC (herein referred to as Consent Decree).

One of the affirmative relief provisions in Section V of the Consent Decree (CD) requires that a Flare Management Plan (FMP) be developed and submitted to the United States Environmental Protection Agency (EPA) by each of the Covered Refineries. This Initial FMP document fulfills the Paragraph 127 CD requirements. For each of the affected Flare(s) at the Salt Lake City Refinery this FMP:

- Lists the process units and equipment connected to the Flare (Paragraph 127.a)
- Assesses if discharges to the Flare can be minimized or prevented (Paragraph 127.b)
- Describes the Flare and associated process equipment (Paragraph 127.c)
- Maps the Waste Gas, purges, and sweeps of the Covered Flare(s) (Paragraph 127.d and 127.h)
- Documents the Waste Gas composition, quantifies flow and provides monitor specifications (Paragraph 127.e)
- Describes each pressure relief valve vented to the Flare (Paragraph 127.f)
- Presents minimization efforts to reduce flaring during Startup and Shutdown (Paragraph 127.g)
- Documents any plans to take Covered Flares out of service (Paragraph 127.i)
- Describes flaring Prevention Measures (Paragraph 127.j)

The history of and revisions to this FMP are described in Appendix A. Flare connections and drawings are provided in Appendix B. Appendix C provides a cross-reference table listing where each requirement of Paragraph 127 is addressed in this FMP. Pursuant to Paragraph 128, this FMP will be updated annually hereafter by April 1 of each subsequent year until the CD is terminated.

1.2 Facility Description

The Tesoro Salt Lake City Refinery processes approximately 60,000 barrels per day of crude oil, producing primarily gasoline and diesel fuel. Other products include liquid propane, refinery Fuel Gas, jet fuel, and heavy fuel oil. Process units include: Crude Distillation, Ultraformer, Fluid Catalytic Cracking with Vapor Recovery, Alkylation, Polymerization, Cogeneration, Benzene Saturation, Gasoline Hydrotreating, Diesel Desulfurization, Sulfur Recovery and Tail Gas Treating, Rail and Truck Loading Racks, Tank Farm, and Wastewater Treatment.

1.3 Affected Flares

The Salt Lake City Refinery operates three Flares: the North Flare, South Flare, and the Sulfur Recovery Unit (SRU) Flare. Only the North and South Flares are considered Covered Flares under the CD. All North and South Flare networks are connected to the Flare Gas Recovery System (FGRS) and provide relief for the operating units. The SRU Flare operates independently and services the SRU and Tail Gas Treating Unit (TGTU), and is not connected to the FGRS. This FMP will address only the North and South Flares. The specifications of the North and South Flares are included in Section 2.0 of this plan.

1.4 Summary of Flare Performance

The primary historical causes of flaring at the Salt Lake City Refinery are refinery maintenance and turnaround activities, external power outages, and Fuel Gas imbalance. An analysis of past flaring events was conducted to determine the most effective means of minimizing or preventing flaring. To reduce the Baseload Waste Gas Flow Rate to the North and South Flares, the Salt Lake City Refinery has evaluated minimization efforts and Prevention Measures in accordance with Paragraph 127.g and Paragraph 127.j.

Flare minimization at the Salt Lake City Refinery has been an ongoing effort. Flare minimization efforts have been evaluated based on feasibility, secondary environmental impacts, and safety considerations.

Flare Prevention Measures were evaluated on Refinery-wide and unit-specific bases. The Flare Prevention Measures at the Salt Lake City Refinery address planned maintenance activities such as Startup and Shutdown of Flaring Process Units; gas quality and quantity; and recurrent failure of air pollution control equipment, process equipment, or process upsets. A full description and evaluation for all Prevention Measures that have or will be implemented at the Salt Lake City Refinery are described in Section 6.0.

2.0 Flare Specifications

2.1 Required Flare Information

CD Paragraph 127.c requires the Flare specifications included in Table 2-1 and Table 2-4 for the North and South Flares respectively, as well as the simple process flow diagram (PFD) included in Appendix B.

2.1.1 North Flare

Table 2-1 North Flare Information Requirements

Flare	North Flare	Reference
127.c Information Requirements		
Ground or elevated	Elevated	127.c.i
Flare height	175 feet above grade	127.c.i
Type of assist system	Steam	127.c.i
Routine or Startup/Shutdown /emergency only	Startup/Shutdown/Emergency Only	127.c.i
Equipped with Flare Gas Recovery System (FGRS)	Yes	127.c.i
Smokeless capacity based on design conditions	8,830 Actual Cubic Feet per Minute (ACFM)	127.c.ii
Maximum Vent Gas flow rate	209,000 lb/hr	127.c.iii
Maximum Supplemental Gas flow rate	6.0 Million Standard Cubic Feet per Day (MMSCFD)	127.c.iv
Minimum Total Steam Rate	540 lb/hr	127.c.v
Maximum Total Steam Rate	29,000 lb/hr	127.c.v
Assist Air blow single speed, multi-fixed speed, or variable speed	Not Applicable - Steam-Assisted Flare	127.c.vi
Air flow versus fan speed setting or fan curve; for fans/blowers with fixed speeds, provide the estimated Assist Air flow rate at each fixed speed. For variable speeds, provide the design fan curve (e.g., air flow rate as a function of power input).	Not Applicable - Steam-Assisted Flare	127.c.vi
Simple Process Flow Diagram (PFD) showing Flare tip, knock-out (KO) pots, Flare headers, subheaders, assist system, and ignition system	See Appendix B	127.c.vii
Flare tip date installed	2013	127.c.vii
Flare tip manufacturer	John Zink	127.c.vii

Flare	North Flare	Reference
Flare tip nominal diameter	24"	127.c.vii
Flare tip effective diameter	21.1"	127.c.vii
Flare tip drawing	Confidential - Available onsite	127.c.vii
KO pot(s) dimensions	F-419: 8'-0" x 30'-0" F-420: 8'-0" x 30'-0" F-506: 9'-11.25" x 30' 5"	127.c.vii
KO pot(s) design capacity	F-419: 114psi at 250°F F-420: 30psi at 250°F F-506: 89psi at 690°F	127.c.vii
127.d Information Requirements		
Description and simple PFD showing all gas lines (including Waste Gas, Purge Gas or Sweep Gas, Supplemental gas) associated with the Covered Flare.	See Appendix B	127.d
Purge Gas type	Natural Gas	127.d
Sweep Gas type	Natural Gas, Nitrogen, Refinery Fuel Gas	127.d
Supplemental Gas type	Natural Gas	127.d
Designate which lines are exempt from composition or NHV monitoring and why	See Appendix B	127.d
Designate which lines are monitored and indicate location and type of each monitor	See Appendix B	127.d
Designate pressure relief devices vented to the Flare	See Appendix B	127.d

2.1.1.1 North Flare Monitoring

In accordance with the requirements of Paragraph 117, the Salt Lake City Refinery has installed an ultrasonic flow monitor with temperature and pressure correction at a location downstream of the water seal as shown in Appendix B. The flow meter began operation on September 11, 2015, prior to the required installation date of April 1, 2017. The flare flow monitoring details, required by Paragraph 127.e, are included below. The ultrasonic flow monitor meets the performance requirements of CD Appendix C-1.10 Section I.

Table 2-2 North Flare Flow Meter Information Requirements

Vent Gas Flow Meter	CD Specification Requirements	Reference	Design Specifications
Type	None	127.e	Ultrasonic Flow Meter
Make	None	127.e	General Electric (GE)
Model	None	127.e	Panametrics Dual-Path GF868-2-11-20024-FM; four transducers model number T17-18-10-36-NT-TI
Precision	None	127.e	± 1% at 0.5 to 394 fps
Velocity range	0.1–250 fps	CD Appendix 1.10	0.1-394 fps
Repeatability	± 10% of reading over the velocity range 0.1 to 1.0 fps ± 1% of reading over the velocity range > 1.0 to 250 fps	CD Appendix 1.10	± 10% 0.1 to 0.5 fps ± 1% 0.5 to 394 fps
Design accuracy	± 5% initially to 40%, 60%, 90% of monitor full scale as certified by the manufacturer	127.e CD Appendix 1.10	± 2% to 5% of flare flow between 1-394 fps
Operational accuracy	± 20% of flow rate at velocities ranging from 0.1 to 1 fps ± 5% of flow rate at velocities greater than 0.3 m/s	CD Appendix 1.10	± 2% to 5% of flare flow between 1-394 fps
Installation	Applicable American Gas Association (AGA), American National Standards Institute (ANSI), American Petroleum Institute (API), or equivalent standard	CD Appendix 1.10	The North Flare flow meter has been installed according to AGA, ANSI, API or an equivalent standard.
Flow rate determination	Corrected to one atmosphere pressure and 68°F	CD Appendix 1.10	Corrected to 1 atm and 68°F
Quality Assurance/Quality Control (QA/QC)	Conduct a flow sensor calibration check at least biennially (every two years); conduct a calibration check following any period of more than 24 hours throughout which the flow rate exceeded the manufacturer's specified maximum rated flow rate or install a new flow sensor. At least quarterly, inspect all components for leakage, unless the meter has a redundant flow sensor. Record the results of each calibration check and inspection. Locate the flow sensor(s) and other necessary equipment (such as straightening vanes) in a position that provides representative flow; reduce swirling flow or abnormal	127.e CD Appendix 1.10	The Salt Lake City Refinery has established calibration, maintenance and Quality Assurance (QA) procedures for the North Flare flow meter.

Vent Gas Flow Meter	CD Specification Requirements	Reference	Design Specifications
	velocity distributions due to upstream and downstream disturbances.		
Temperature monitor accuracy	$\pm 1\%$ over the normal range of temperature measured, expressed in degrees Celsius, or 2.8 degrees C, whichever is greater.	CD Appendix 1.10	Per the manufacturer, the flow meter temperature sensor meets this requirement
Temperature monitor QA/QC	Conduct calibration checks at least annually; conduct calibration checks following any period of more than 24 hours throughout which the temperature exceeded the manufacturer's specified maximum rated temperature or install a new temperature sensor. At least quarterly, inspect all components for integrity and all electrical connections for continuity, oxidation, and galvanic corrosion, unless the Continuous Parameter Monitoring System (CPMS) has a redundant temperature sensor. Record the results of each calibration check and inspection.	CD Appendix 1.10	The Salt Lake City Refinery has established calibration, maintenance, and QA procedures for the temperature monitor for the North Flare flow meter.
Location of temperature sensor	Provides a representative temperature; shield the temperature sensor system from electromagnetic interference and chemical contaminants.	CD Appendix 1.10	The location and installation of the North Flare flow meter temperature sensor meets the CD requirements.
Pressure monitor accuracy	$\pm 5\%$ over the normal range or 0.12 kPa, whichever is greater.	CD Appendix 1.10	Per the manufacturer, the flow meter pressure sensor meets this requirement
Pressure monitor QA/QC	Review pressure sensor readings at least once a week for straight line (unchanging) pressure and perform corrective action to ensure proper pressure sensor operation if blockage is indicated. Using an instrument recommended by the sensor's manufacturer, check gauge calibration and transducer calibration annually; conduct calibration checks following a period of more than 24 hours throughout which the pressure exceeded the manufacturer's specified maximum rates pressure or install a new pressure sensor. At least quarterly, inspect all components for integrity and all electrical connections for continuity, and all mechanical connections for leakage, unless the CPMS has a redundant pressure sensor. Record the results of each calibration check and inspection.	CD Appendix 1.10	The Salt Lake City Refinery has established calibration, maintenance, and QA procedures for the pressure monitor for the North Flare flow meter.

Vent Gas Flow Meter	CD Specification Requirements	Reference	Design Specifications
Location of pressure sensor	Provides a representative measurement of the pressure and minimizes or eliminates pulsating pressure, vibration, and internal and external corrosion.	CD Appendix 1.10	The location of the North Flare flow meter pressure sensor meets the CD requirements.

In accordance with the requirements of Paragraph 118, the Salt Lake City Refinery installed a gas chromatograph (GC) to monitor Vent Gas composition. The GC began operation on September 16, 2015, prior to the required installation date of April 1, 2017. The GC completes at least one cycle of operation for each successive 15-minute Block Average Period to meet the requirements of Paragraph 122. The GC meets the applicable requirements of CD Appendix C-1.10 Section V.

Table 2-3 North Flare Gas Chromatograph Information Requirements

Gas Chromatograph	CD Specification Requirements	Reference	Design Specifications
Type	None	127.e	Gas Chromatograph (GC)
Make	None	127.e	Siemens
Model	None	127.e	MAXUM II
Range	None	127.e	Constituent-dependent, see "Constituents Measured" for specific ranges for each compound
Precision	None	127.e	0.5-5 ppm: $\pm 5\%$ 5-50 ppm: $\pm 3\%$ 50-500 ppm: $\pm 2\%$ 0.05-2%: $\pm 1\%$ 2-100%: $\pm 0.5\%$
Calibration, maintenance, and Quality Assurance (QA) procedures	None	127.e	The Salt Lake City Refinery has established calibration, maintenance and QA procedures for the North Flare GC.
Accuracy	As specified in Performance Specification 9 of 40 C.F.R. Part 60, Appendix B.	127.e CD Appendix 1.10	The North Flare GC's accuracy is in line with Performance Specification 9 of 40 C.F.R. Part 60, Appendix B.
8-Hour Repeatability	$\pm 0.5\%$ of full scale for ranges between 2-100% of full scale; $\pm 1\%$ of full scale for ranges between 0.05-2% of full scale; $\pm 2\%$ of full scale for ranges between 50-500 ppm; $\pm 3\%$ of full scale for ranges between 5-50 ppm; $\pm 5\%$ of full scale for ranges between 0.5-5 ppm.	CD Appendix 1.10	The 8-hour repeatability of the North Flare GC meets the requirements of the CD.
Minimum Sampling Frequency	Every 15 minutes.	CD Appendix 1.10	Less than or equal to 15 minutes

Gas Chromatograph	CD Specification Requirements	Reference	Design Specifications
Constituents Measured	Hydrogen Carbon monoxide (optional) Methane Ethane Ethene Propane Propene 2-Methylpropane Butane Butenes and 1,3 butadiene N-pentane Acetylene (optional) Propadiene (optional) Hydrogen sulfide (optional)	CD Appendix 1.10	Hydrogen (0-100 mol%) Carbon monoxide (0-50 mol%) Methane (0-100 mol%) Ethane (0-100 mol%) Ethene (0-100 mol%) Propane (0-100 mol%) Propene (0-100 mol%) 2-Methylpropane (0-100 mol%) Butane (0-100 mol%) Butenes and 1,3 butadiene (0-100 mol%) N-pentane (0-100 mol% for C5+ hydrocarbons)
Minimum Sampling Line Temperature	60°C	CD Appendix 1.10	60°C
Sampling Location	Where technically feasible, the sampling location should be at least two equivalent duct diameters downstream from the nearest control device, point of pollutant generation, or other point at which a change in the pollutant concentration or emission rate occurs. The location should not be close to air in-leakages. Where technically feasible, the location should also be at least 0.5 diameters upstream from the exhaust or control device.	CD Appendix 1.10	The North Flare GC's sampling location meets the requirements of the CD.

2.1.2 South Flare

Table 2-4 South Flare Information Requirements

Flare	South Flare	Reference
127.c Information Requirements		
Ground or elevated	Elevated	127.c.i
Flare height	175 feet above grade	127.c.i
Type of assist system	Steam	127.c.i
Routine or Startup/Shutdown /emergency only	Startup/Shutdown/Emergency Only	127.c.i
Equipped with Flare Gas Recovery System (FGRS)	Yes	127.c.i
Smokeless capacity based on design conditions	1,290 Actual Cubic Feet per Minute (ACFM)	127.c.ii
Maximum Vent Gas flow rate	678,000 lb/hr	127.c.iii
Maximum Supplemental Gas flow rate	6.0 Million Standard Cubic Feet per Day (MMSCFD)	127.c.iv
Minimum Total Steam Rate	200 lb/hr	127.c.v
Maximum Total Steam Rate	39,000 lb/hr	127.c.v
Assist Air blow single speed, multi-fixed speed, or variable speed	Not Applicable - Steam-Assisted Flare	127.c.vi
Air flow versus fan speed setting or fan curve; for fans/blowers with fixed speeds, provide the estimated Assist Air flow rate at each fixed speed. For variable speeds, provide the design fan curve (e.g., air flow rate as a function of power input).	Not Applicable - Steam-Assisted Flare	127.c.vi
Simple Process Flow Diagram (PFD) showing Flare tip, knock-out (KO) pots, Flare headers, subheaders, assist system, and ignition system	See Appendix B	127.c.vii
Flare tip date installed	2010	127.c.vii
Flare tip manufacturer	NAO	127.c.vii
Flare tip nominal diameter	24"	127.c.vii
Flare tip effective diameter	20"	127.c.vii
Flare tip drawing	Confidential - Available onsite	127.c.vii
KO pot(s) dimensions	V-107: 8'0" ID x 20'0" V-6: 8'0" ID x 24'-0" D-636: 10'0" ID x 30'-0"	127.c.vii

Flare	South Flare	Reference
KO pot(s) design capacity	V-107: 50psi at 600°F V-6: 30psi at 650°F D-636: 95psi at 650°F	127.c.vii
127.d Information Requirements		
Description and simple PFD showing all gas lines (including Waste Gas, Purge Gas or Sweep Gas, Supplemental gas) associated with the Covered Flare.	See Appendix B	127.d
Purge Gas type	Natural Gas	127.d
Sweep Gas type	Nitrogen, Refinery Fuel Gas	127.d
Supplemental Gas type	Natural Gas	127.d
Designate which lines are exempt from composition or NHV monitoring and why	See Appendix B	127.d
Designate which lines are monitored and indicate location and type of each monitor	See Appendix B	127.d
Designate pressure relief devices vented to the Flare	See Appendix B	127.d

2.1.2.1 South Flare Monitoring

In accordance with the requirements of Paragraph 117, the Salt Lake City Refinery has installed an ultrasonic flow monitor with temperature and pressure correction at a location downstream of the water seal as shown in Appendix B. The flow meter began operation on February 24, 2015, prior to the required installation date of April 1, 2017. The flare flow monitoring details, required by Paragraph 127.e, are included below. The ultrasonic flow monitor meets the performance requirements of CD Appendix C-1.10 Section I.

Table 2-5 South Flare Flow Meter Information Requirements

Vent Gas Flow Meter	CD Specification Requirements	Reference	Design Specifications
Type	None	127.e	Ultrasonic Flow Meter
Make	None	127.e	General Electric (GE)
Model	None	127.e	Panametrics Dual-Path GF868-2-11-20024-FM; four transducers model number T17-18-10-36-NT-TI
Precision	None	127.e	± 1% at 0.5 to 394 fps
Velocity range	0.1–250 fps	CD Appendix 1.10	0.1-394 fps
Repeatability	± 10% of reading over the velocity range 0.1 to 1.0 fps ± 1% of reading over the velocity range > 1.0 to 250 fps	CD Appendix 1.10	± 10% 0.1 to 0.5 fps ± 1% 0.5 to 394 fps
Design accuracy	± 5% initially to 40%, 60%, 90% of monitor full scale as certified by the manufacturer	127.e CD Appendix 1.10	± 2% to 5% of flare flow between 1-394 fps
Operational accuracy	± 20% of flow rate at velocities ranging from 0.1 to 1 fps ± 5% of flow rate at velocities greater than 0.3 m/s	CD Appendix 1.10	± 2% to 5% of flare flow between 1-394 fps
Installation	Applicable AGA, ANSI, API, or equivalent standard	CD Appendix 1.10	The South Flare flow meter has been installed according to AGA, ANSI, API or an equivalent standard.
Flow rate determination	Corrected to one atmosphere pressure and 68°F	CD Appendix 1.10	Corrected to 1 atm and 68°F
Quality Assurance/Quality Control (QA/QC)	Conduct a flow sensor calibration check at least biennially (every two years); conduct a calibration check following any period of more than 24 hours throughout which the flow rate exceeded the manufacturer's specified maximum rated flow rate or install a new flow sensor. At least quarterly, inspect all components for leakage, unless the meter has a redundant flow sensor. Record the results of each calibration check and inspection. Locate the flow sensor(s) and other necessary equipment (such as straightening vanes) in a position that provides representative flow; reduce swirling flow or abnormal	127.e CD Appendix 1.10	The Salt Lake City Refinery has established calibration, maintenance and Quality Assurance (QA) procedures for the South Flare flow meter.

Vent Gas Flow Meter	CD Specification Requirements	Reference	Design Specifications
	velocity distributions due to upstream and downstream disturbances.		
Temperature monitor accuracy	$\pm 1\%$ over the normal range of temperature measured, expressed in degrees Celsius, or 2.8 degrees C, whichever is greater.	CD Appendix 1.10	Per the manufacturer, the flow meter temperature sensor meets this requirement
Temperature monitor QA/QC	Conduct calibration checks at least annually; conduct calibration checks following any period of more than 24 hours throughout which the temperature exceeded the manufacturer's specified maximum rated temperature or install a new temperature sensor. At least quarterly, inspect all components for integrity and all electrical connections for continuity, oxidation, and galvanic corrosion, unless the Continuous Parameter Monitoring System (CPMS) has a redundant temperature sensor. Record the results of each calibration check and inspection.	CD Appendix 1.10	The Salt Lake City Refinery has established calibration, maintenance, and QA procedures for the temperature monitor for the South Flare flow meter.
Location of temperature sensor	Provides a representative temperature; shield the temperature sensor system from electromagnetic interference and chemical contaminants.	CD Appendix 1.10	The location and installation of the South Flare flow meter temperature sensor meets the CD requirements.
Pressure monitor accuracy	$\pm 5\%$ over the normal range or 0.12 kPa, whichever is greater.	CD Appendix 1.10	Per the manufacturer, the flow meter pressure sensor meets this requirement
Pressure monitor QA/QC	Review pressure sensor readings at least once a week for straight line (unchanging) pressure and perform corrective action to ensure proper pressure sensor operation if blockage is indicated. Using an instrument recommended by the sensor's manufacturer, check gauge calibration and transducer calibration annually; conduct calibration checks following a period of more than 24 hours throughout which the pressure exceeded the manufacturer's specified maximum rates pressure or install a new pressure sensor. At least quarterly, inspect all components for integrity and all electrical connections for continuity, and all mechanical connections for leakage, unless the CPMS has a redundant pressure sensor. Record the results of each calibration check and inspection.	CD Appendix 1.10	The Salt Lake City Refinery has established calibration, maintenance, and QA procedures for the pressure monitor for the South Flare flow meter.

Vent Gas Flow Meter	CD Specification Requirements	Reference	Design Specifications
Location of pressure sensor	Provides a representative measurement of the pressure and minimizes or eliminates pulsating pressure, vibration, and internal and external corrosion.	CD Appendix 1.10	The location of the South Flare flow meter pressure sensor meets the CD requirements.

In accordance with the requirements of Paragraph 118, the Salt Lake City Refinery installed a GC to monitor Vent Gas composition. The GC began operation on September 16, 2015, prior to the required installation date of April 1, 2017. The GC completes at least one cycle of operation for each successive 15-minute Block Average Period to meet the requirements of Paragraph 122. The GC meets the applicable requirements of CD Appendix C-1.10 Section V.

Table 2-6 South Flare Gas Chromatograph Information Requirements

Gas Chromatograph	CD Specification Requirements	Reference	Design Specifications
Type	None	127.e	Gas Chromatograph (GC)
Make	None	127.e	Siemens
Model	None	127.e	MAXUM II
Range	None	127.e	Constituent-dependent, see "Constituents Measured" for specific ranges for each compound
Precision	None	127.e	0.5-5 ppm: $\pm 5\%$ 5-50 ppm: $\pm 3\%$ 50-500 ppm: $\pm 2\%$ 0.05-2%: $\pm 1\%$ 2-100%: $\pm 0.5\%$
Calibration, maintenance, and Quality Assurance (QA) procedures	None	127.e	The Salt Lake City Refinery has established calibration, maintenance and QA procedures for the South Flare GC.
Accuracy	As specified in Performance Specification 9 of 40 C.F.R. Part 60, Appendix B.	127.e CD Appendix 1.10	The South Flare GC's accuracy is in line with Performance Specification 9 of 40 C.F.R. Part 60, Appendix B.
8-Hour Repeatability	$\pm 0.5\%$ of full scale for ranges between 2-100% of full scale; $\pm 1\%$ of full scale for ranges between 0.05-2% of full scale; $\pm 2\%$ of full scale for ranges between 50-500 ppm; $\pm 3\%$ of full scale for ranges between 5-50 ppm; $\pm 5\%$ of full scale for ranges between 0.5-5 ppm.	CD Appendix 1.10	The 8-hour repeatability of the South Flare GC meets the requirements of the CD.
Minimum Sampling Frequency	Every 15 minutes.	CD Appendix 1.10	Less than or equal to 15 minutes

Gas Chromatograph	CD Specification Requirements	Reference	Design Specifications
Constituents Measured	Hydrogen Carbon monoxide (optional) Methane Ethane Ethene Propane Propene 2-Methylpropane Butane Butenes and 1,3 butadiene N-pentane Acetylene (optional) Propadiene (optional) Hydrogen sulfide (optional)	CD Appendix 1.10	Hydrogen (0-100 mol%) Carbon monoxide (0-50 mol%) Methane (0-100 mol%) Ethane (0-100 mol%) Ethene (0-100 mol%) Propane (0-100 mol%) Propene (0-100 mol%) 2-Methylpropane (0-100 mol%) Butane (0-100 mol%) Butenes and 1,3 butadiene (0-100 mol%) N-pentane (0-100 mol% for C5+ hydrocarbons)
Minimum Sampling Line Temperature	60°C	CD Appendix 1.10	60°C
Sampling Location	Where technically feasible, the sampling location should be at least two equivalent duct diameters downstream from the nearest control device, point of pollutant generation, or other point at which a change in the pollutant concentration or emission rate occurs. The location should not be close to air in-leakages. Where technically feasible, the location should also be at least 0.5 diameters upstream from the exhaust or control device.	CD Appendix 1.10	The South Flare GC's sampling location meets the requirements of the CD.

3.0 Flare Connections

3.1 Description of Flare Connection Determination Process

All refinery Flaring Process Units, ancillary equipment, and Fuel Gas Systems connected to the North and South Flares, as required by Paragraph 127.a, are identified in the Waste Gas maps and connection list table included in Appendix B.

The Salt Lake City Refinery conducted flare mapping of connections for the 40 CFR Part 60 Subpart Ja Flare Management Plan due November 11, 2015. For this Consent Decree Flare Management Plan (CDFMP), the Subpart Ja list of connections was reviewed and updated. Flare connections were determined using piping and instrumentation diagrams (P&IDs) and input from experienced process engineers and operators. Flare connections will be kept up-to-date using the refinery's management of change (MOC) process. The Environmental Checklist, which is required for every physical change (except those which are direct replacements using in-kind equipment), includes changes to the Flare which could affect connections, contributions, or Flare operation.

3.2 North and South Flare Connection List

The North and South Flares have many connections including pressure relief valves (PRVs), control valves (CVs), knock-out pots, manual valves, blowdown valves, pressure controllers, open connections (for venting small quantities of light hydrocarbon entrained in otherwise non-volatile liquids), sample connections, analyzer vents, and others. The detailed list of the flare connections is included in Appendix B.

4.0 Pressure Relief Valves

The CD, under Paragraph 127.f, requires a detailed description of each PRV, including type of relief device (e.g. rupture disc, valve type), diameter of the relief valve, set pressure of the relief valve, and listing of the Prevention Measures implemented. As allowed by the CD, this information is maintained on-site and is not included with this FMP. The required information is available upon request from the EPA. For the Prevention Measures analysis, the Salt Lake City Refinery process engineering, operations, and environmental staff reviewed P&IDs, Process Hazard Analyses (PHAs), and relevant equipment files to complete the review and documentation for each PRV.

5.0 Waste Gas Characterization and Mapping

The CD, within Paragraph 127.h and Appendix C-1.11, requires determination of the 30-day Rolling Average volumetric flow rate, the Baseload Waste Gas Flow Rate, and the identification of constituent gases within the Waste Gas. In addition, Waste Gas Mapping is required using a combination of instrumentation, monitoring, and/or engineering calculations.

5.1 Waste Gas Characterization

Paragraphs 127.h.i-iii require evaluation of the volumetric Waste Gas Flow Rate, Baseload Waste Gas Flow Rate, and Waste Gas.

5.1.1 30-day Rolling Average Volumetric Flow Rate

Paragraph 127.h.i requires identification of the 30-day Rolling Average Waste Gas flow rate between December 1, 2015 and November 30, 2016.

The 30-day Rolling Average Waste Gas flow for the required time period is shown in Figure 1. Flare flow and composition were determined using the instruments described in Sections 2.1.1.1 and 2.1.2.1 above.

The only time period excluded from the historical 30-day Waste Gas flow is from 10:00pm on May 19, 2016 through 11:00pm on May 24, 2016, during which the refinery was responding to an external power outage not due to an interruptible service agreement.

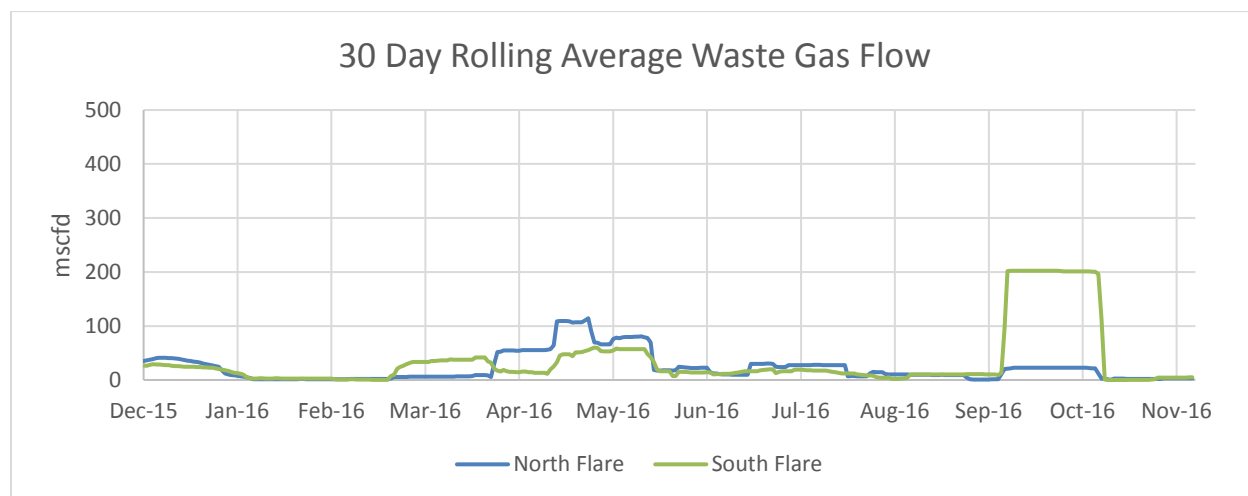


Figure 1 30-day Rolling Average Waste Gas flow between December 1, 2015 and November 30, 2016

The increase in South Flare flow in September was due to the Shutdown and decontamination of the South Area for a planned turnaround event.

5.1.2 Baseload Waste Gas Flow Rate

In accordance with Paragraph 127.h.ii, the Baseload Waste Gas Flow Rates to the North and South Flares are provided for December 1, 2015 to November 30, 2016. The Baseload Waste Gas Flow Rate does not include periods of Startup, Shutdown, and Malfunction. Based on the definition of Waste Gas, the Baseload Waste Gas Flow Rate also does not include inert constituents (hydrogen, nitrogen, carbon monoxide, carbon dioxide, and oxygen) or Pilot Gas, Total Steam, Assist Air, minimum Sweep Gas, and Purge Gas.

The Baseload Waste Gas Flow Rate was determined by measuring the Vent Gas Volumetric Flow Rate and monitoring the constituents. The Baseload Waste Gas Flow Rate from December 1, 2015 to November 30, 2016 was 18.8 mscfd for the North Flare and 20.6 mscfd for the South Flare. All Startup, Shutdown, or Malfunction flaring events that were excluded from the Baseload Waste Gas Flow Rate, in accordance with Paragraph 127.h.ii, are provided in Table 5-1 below.

Table 5-1 Startup, Shutdown and Malfunction events that were excluded from the Baseload Waste Gas Flow Rate in accordance with Paragraph 127.h.ii

Description of Event	Date Range	Startup, Shutdown, or Malfunction (SSM)
DDU Shutdown	3/19/2016 – 3/26/2016	Shutdown
External Power Outage	5/19/2016 – 5/24/2016	Malfunction
Shutdown and Decontamination	10/1/2016 – 10/3/2016	Shutdown

5.1.3 Identification of Waste Gas Constituent Gases

As required by Paragraph 127.h.iii, the constituent gases within the Waste Gas of the North and South Flare headers have been determined for baseload conditions. The typical range of constituent concentrations was determined during baseload conditions using engineering evaluations, measurements, and monitoring. The primary approach for this determination was to utilize composition information prior to the Startup of the FGRS, when the GC monitors constantly measured the Vent Gas streams, then utilize engineering estimates to account for process changes after the Startup of FGRS and installation of the water seal.

For the Salt Lake City Refinery, the GC monitors the required constituents in a location representative of the entire flow to the Flare tip. Table 5-2 and Table 5-3 below show the Waste Gas Compositions for the North and South Flares.

Table 5-2 North Flare Waste Gas Composition under baseload conditions

Component	Typical Mole %
Hydrogen	28% (1-56%)
Argon/Oxygen	1% (0-2%)
Nitrogen	20% (15-25%)
Carbon Monoxide	0%
Carbon Dioxide	1% (0-1%)
Methane	9% (3-15%)
Ethylene	2% (0-4%)
Ethane	3% (1-5%)
Hydrogen Sulfide	0%
Propane	9% (0-18%)
Propylene	2% (1-4%)
Isobutane	7% (1-15%)
Butane	2% (0-4%)
C6+	1% (0-2%)
C4 Olefins	1% (0-2%)
C5s	1% (0-2%)

Table 5-3 South Flare Waste Gas Composition under baseload conditions

Component	Typical Mole %
Hydrogen	24% (13-35%)
Argon/Oxygen	0%
Nitrogen	33% (26 – 40%)
Carbon Monoxide	0%
Carbon Dioxide	0% (0-1%)
Methane	25% (11-40%)
Ethylene	1% (0-1%)
Ethane	3% (1-4%)
Hydrogen Sulfide	0%
Propane	1% (0-2%)
Propylene	0%
Isobutane	0% (0-1%)
Butane	0% (0-1%)
C6+	1% (0-6%)
C4 Olefins	0%
C5s	0% (0-1%)

5.2 Waste Gas Mapping

Paragraph 127.h.iv requires identification and estimation of the flow from each Flaring Process Unit Flare header to the main flare header(s) and identification of each Waste Gas tie-in consistent with CD Appendix C-1.11. Appendix B provides this required information.

The flows through flaring process unit headers six inches or greater in diameter are quantified, where technically feasible, as required by CD Appendix C-1.11. The flow estimates were determined by reviewing flare connections, determining which contributed regular flow, and quantifying the cumulative flow through each Flaring Process Unit header. The flow estimates were completed using a combination of historical operations data and engineering calculations. Table 5-4 includes the Baseload Waste Gas Flow Rates for each flaring process unit header to the FGRS.

Table 5-4 Flare Header Contributions

Flare Process Unit Header	Flow (mscfd)
Q _{Alky1}	0
Q _{Alky2}	0
Q _{Alky3}	3.8
Q _{Alky4}	31.7
Q _{Poly3}	0
Q _{Poly4}	0
Q _{BP1}	0
Q _{FCU4}	0
Q _{VRU2}	1.5
Q _{VRU3}	0
Q _{GHT}	92.1
Q _{N2C3}	14.4
Q _{UFU1}	0
Q _{UFU4}	26.6
Q _{UFU5}	0
Q _{BEN1}	5.1
Q _{DDU3}	56.2

6.0 Prevention Measures

6.1 Requirements

Per Paragraph 127.j of the CD, Tesoro shall describe and evaluate all Prevention Measures, including a schedule for the expeditious implementation and commencement of operation of all Prevention Measures, to address the following:

- i. Flaring that has occurred or may reasonably be expected to occur during planned maintenance activities, including Startup and Shutdown. The evaluation shall include a review of flaring that has occurred during these activities in the past three years and shall consider the feasibility of performing these activities without flaring.
- ii. Flaring that may reasonably be expected to occur due to issues of gas quantity and quality. The evaluation shall include an audit of the flare gas recovery capacity of each Covered Flare subject to this requirement as set forth in Appendix C - 2.1, the capacity including internal piping systems and the amine treating capacity available for Waste Gases including any limitations associated with the amine treating of Waste Gases for use as fuel. The evaluation shall consider the feasibility of reducing flaring through the recovery, treatment, and use of the Waste Gas.
- iii. Flaring caused by the recurrent failure of air pollution control equipment, process equipment, or a process to operate in a normal or usual manner. The evaluation shall consider the adequacy of existing maintenance schedules and protocols for such equipment. A failure is "recurrent" if it occurs more than twice during any five year period as a result of the same root cause.

Prevention Measure is a defined term in the CD: *Prevention Measure shall mean an instrument, device, piece of equipment, system, process change, physical change to process equipment, procedure, or program to minimize or eliminate flaring.*

6.2 Approach

To develop this plan, experienced representatives of the Operations, Process Engineering, and Environmental departments evaluated historical and potential flaring events due to Startup and Shutdown, gas quantity and quality, recurrent failures, emergencies, and other causes. The group identified Prevention Measures warranting further review. Evaluation of potential Prevention Measures was primarily based on the impact to overall flare emissions. Additional considerations included secondary environmental impacts, operability, and feasibility.

Secondary environmental impacts are a critical consideration as a singular focus on a single emission point may lead to additional emissions elsewhere. All emission points must be considered when determining reduction efforts at a single point, including Flares. Operability considerations are included to preserve operational stability and predictability. If operability is compromised, unstable operation may

lead to unanticipated secondary environmental impacts. Feasibility is a key consideration to ensure the refinery's focus is on actionable Prevention Measures.

The evaluation of Prevention Measures included review of historical flare flow information, assessments of the impacts of the FGRS, and input from experienced operators and engineers.

The review of historical flare information allowed refinery personnel to evaluate the flare performance resulting from past and current operations. Historical information was used to identify periods of high flow which were then investigated to determine the causes.

The FGRS was installed in 2015 and most of the historical flare flow analysis is thus based on events prior to the FGRS operation. The FGRS has been evaluated to determine its utility both as a means of eliminating flaring during all modes of planned operation and as a means of eliminating or reducing flaring during process upsets and emergencies. Historical flaring events were evaluated to determine how they would have been affected by the FGRS and how the FGRS can be used to eliminate or minimize flaring under similar conditions in the future.

Experienced operators and engineers analyzed historical flaring and the anticipated impacts of, and optimization of, the FGRS. Additionally, they provided input on dynamics of the flare system not discernible from historical analysis alone. Following identification of conditions leading to flaring or the risk of flaring, the operators and engineers conducted the analysis of the impacts, effectiveness, and feasibility of potential Prevention Measures.

Specific Prevention Measures are included under each category below.

6.3 Evaluation of Flaring Due to Startup and Shutdown

6.3.1 Evaluation of Flaring Due to Startup and Shutdown

6.3.1.1 Approach

The evaluation of flaring due to Startup and Shutdown included the process described in Section 6.2 above. Flare flow due to past Startup and Shutdown events was then assessed to determine how and if it could be minimized or prevented as required by Paragraph 127.j.i.

6.3.1.2 Primary Causes of Flaring Due to Startup and Shutdown

Startup and Shutdown flaring events fall into two categories: those that can be conducted without flaring and those for which flaring is required or unavoidable.

Startup and Shutdown activities for which flaring can be eliminated include small-scale maintenance activities on single pieces of equipment up to full Process Unit Shutdowns. The key factors in determining whether flaring can be eliminated is whether there are processes capable of consuming the material vented from the equipment or units being Shutdown. Factors leading to flaring thus include gas routing and Fuel Gas demand limitations. Routing limitations may include pressure differentials, pipe

configurations, operability, and other factors. Fuel Gas demand limitations may be localized to the processes accepting vented material or refinery-wide.

6.3.2 Refinery-Wide Prevention Measures for Flaring Due to Startup and Shutdown

This section describes the Prevention Measures implemented across both refinery Flares to prevent or minimize flaring due to Startup and Shutdown. The implementation scope and schedule for each Prevention Measure are specified below.

6.3.2.1 Startup and Shutdown Sequencing to Eliminate or Minimize Flaring

Background

The key strategy for preventing and minimizing flaring during Startup and Shutdown is maximizing the amount of material vented from equipment which can be consumed by refinery processes rather than flared. It is thus desirable to keep refinery processes capable of consuming vented material operating as long as possible while processes generating refinery Fuel Gas are Shutdown. Alternatively, upon Startup, bringing refinery Fuel Gas consumers online first is advantageous to prevent or minimize flaring.

Though the refinery will schedule Startup and Shutdown sequences with material and Fuel Gas balances as significant factors, there are challenges which can preclude complete implementation of this strategy. These challenges include storage capacity for both feedstocks to and products from Fuel Gas consuming units, gas routing limitations, and operational stability.

In addition to the Startup and Shutdown sequences, the rate at which these activities are conducted can affect the volume of material flared. At times it may be advantageous to conduct a certain aspect of the event slowly, such as when a decreased vent rate allows excess material to be consumed by another refinery process instead of exceeding the consumer's capacity. Alternatively, there are conditions when a faster rate of venting may be required. An example of this condition would be venting of inert constituents that cannot safely be routed to the Fuel Gas System and must be flared.

Prevention Measures

1001. The sequence for Startup and Shutdown of full process units or for maintenance activities during which flaring is anticipated will be planned to balance the Fuel Gas System to the degree possible based on storage capacity, gas routing limitations, FGRS temperature limits, and operational stability. Implementation of the plan will be led by a Flare Coordinator.
1002. Plans for Startup and Shutdown of full process units or for maintenance activities during which flaring is anticipated will include an evaluation of the rate at which venting should occur to prevent or minimize flaring.
1003. Plans for Startup and Shutdown of full process units or for maintenance activities during which flaring is anticipated will include monitoring of flaring and provide primary and contingency options to minimize flaring, if it occurs, to be coordinated by the Flare Coordinator.

1004. The refinery will evaluate full process unit Startup and Shutdown events which lead to flaring to determine where changes in procedures, plans, or equipment configurations can effectively prevent or minimize flaring in the future.

Schedule for Implementation

Prevention Measures #1001-1003 within this section have been implemented.

Prevention Measure #1004 will be an ongoing activity following each Startup and Shutdown event that leads to flaring.

6.3.2.2 Minimizing the Quantity of Gas Required to Deinventory and Render Vessels Inert for Maintenance

Background

To conduct maintenance on refinery equipment, it must first be deinventoried of its operating contents and then decontaminated. The traditional means of inerting equipment is to purge the vapor space with steam or nitrogen. When the overall refinery Fuel Gas consumption volume is high, the nitrogen can be vented to the Fuel Gas System or FGRS without adversely affecting the combustion characteristics of Fuel Gas consumers. When the refinery Fuel Gas consumption volume is low, such as during Shutdown, or when there is not sufficient Fuel Gas demand, the nitrogen must be vented to the flare system.

Preventing or minimizing the flaring of nitrogen or steam and associated hydrocarbons is accomplished by maximizing consumption of vented material as described in Section 6.3.2.1 above and by reducing the quantity of gas required to render equipment inert. Prevention Measure #1005 below describes the actions the refinery will take to use chemical cleaning and other means to minimize the volume of vented material, when feasible.

Prevention Measure

1005. Plans for Startup and Shutdown events of full process units or for maintenance activities during which flaring is anticipated may include an evaluation of whether alternative means of deinventorying and inerting vessels is feasible and necessary to prevent or minimize flaring.
- a. Examples of alternative means of deinventorying and inerting vessels to be evaluated include:
 - i. Chemical cleaning
 - ii. Volume of inerting gases
 - iii. Steam-out rates and durations

Schedule for Implementation

Prevention Measure #1005 has been implemented for the South Area as part of the Shutdown conducted in 2016. Decontamination plans for the North Area will be completed prior to the next scheduled refinery turnaround. It is not prudent to update the North Area procedures prior to this time as doing so would preclude consideration of lessons learned and any changes to the process units' configurations.

6.3.2.3 Refinery Shutdown Planning

Background

Steam used to remove hydrocarbons and other material from the process units during Shutdown has, in the past, been vented to the Flare. The steam cannot be routed to the FGRS as it would lead to exceeding the maximum temperature limit of the Compressors. To prevent as much steam as possible from reaching either the Flare or the FGRS, the refinery has evaluated each process unit to determine if it can be isolated from the Flare and connected to temporary or permanent condensers.

Prevention Measure

1006. The refinery has evaluated each process unit to determine if its current configuration allows for condensing of the steam required for Shutdown. Plans have been developed for those requiring additional isolation or connections. The following is a summary of the changes implemented to aid condensing:
- a. Added condensing ports to the South Area in 2016
 - b. Added tie-ins for additional condensing capacity at the FGRS
 - c. Condensing ports will be added to the North Area during the next area turnaround

Schedule

The condenser port and tie-in installations required by Prevention Measures #1006.a and b have been completed. The installations required under Prevention Measure #1006.c will be completed in conjunction with the next North Area turnaround.

6.4 Evaluation of Flaring Due to Gas Quantity and Quality

6.4.1 Evaluation of Flaring Due to Gas Quantity and Quality

6.4.1.1 Approach

The evaluation of flaring due to gas quantity and quality included the evaluation described in Section 6.2 above, as well as the requirements specified by Paragraph 127.j.ii.

Paragraph 127.j.ii requires that the evaluation of flaring due to issues of gas quantity and quality include an audit of the FGRS capacity, the capacity including internal piping systems, and the amine treating capacity available for Waste Gases including any limitations associated with the amine treating of Waste Gases for use as fuel. The evaluation must also consider the feasibility of reducing flaring through the recovery, treatment, and use of Waste Gas.

The FGRS capacity, including Compressors and associated systems, meets the requirement of Paragraph 130. The amine treating capacity is sufficient for the Compressors' capacity.

6.4.1.2 Primary Causes of Flaring Due to Gas Quantity and Quality

Flaring due to gas quantity may be caused either by momentary exceedance of the FGRS Compressors' capacities which leads to breaking the water seal or by an overall refinery Fuel Gas imbalance during which excess gas is flared via the water seal bypass line for specific scenarios authorized by the CD. The

frequency and magnitude of either condition may be exacerbated by high baseload flow to the FGRS Compressors. Prevention Measures to prevent or minimize flaring due to gas quantity thus focus on all venting which affects the baseload flow to the Compressors, high flow rate venting which may exceed the Compressors' capacities, and the overall refinery Fuel Gas balance.

Flaring due to gas quality occurs when the recovered Vent Gas composition is not suitable for combustion in the refinery process heaters and/or boilers and other fuel-burning equipment. Such conditions may include excess hydrogen or nitrogen. Fuel Gas quality may also be impacted by an upset in the refinery Fuel Gas amine treating system. Prevention Measures for gas quality are thus focused on the performance and reliability of the amine system.

6.4.2 Refinery-Wide Prevention Measures for Flaring Due to Gas Quantity and Quality

This section describes the Prevention Measures implemented across both refinery Flares to prevent or minimize flaring due to gas quantity and quality. The implementation scope and schedule for each Prevention Measure are specified below. Prevention Measures specific to individual Flares or Flaring Process Units are described in Section 6.4.3 below.

In addition to the Prevention Measures cited in Sections 6.4.2 and 6.4.3, several of the Prevention Measures in Sections 6.3 and 6.5 impact conditions under which flaring may occur due to gas quantity. Such Prevention Measures are included outside Section 6.4 because the root causes can more appropriately be categorized as based on Startup, Shutdown, or recurrent failures.

6.4.2.1 Maximizing FGRS Availability and Effectiveness

Background

The FGRS is one of the most effective means of preventing and minimizing flaring. As such, maximizing its availability and recovery effectiveness is critical.

Maximizing FGRS availability involves effective preventative maintenance to prevent equipment failures and coordinating maintenance of the FGRS and associated systems with times when the risk of flaring is minimized.

Effective preventative maintenance includes following established maintenance practices and procedures, as well as incorporating into the preventative maintenance program any site-specific knowledge gained through Compressor operations.

Coordinating maintenance of the FGRS and associated systems with times when the risk of flaring is minimized involves several conditions. It is optimal to conduct FGRS maintenance when Flaring Process Units are offline. When FGRS maintenance must be conducted while Flaring Process Units are online, limiting venting while maintenance is conducted is critical.

Maximizing FGRS recovery effectiveness involves minimizing the baseload flow to the Compressors to reserve capacity for process upsets and emergencies, scheduling necessary venting to the flare header to

avoid breaking the water seal, coordinating venting activities as schedules change, and effectively staging the Compressors to take advantage of the full recovery capacity by using techniques to have the spare Compressor in standby mode.

Minimizing baseload flow to the Compressors is achieved by evaluating all anticipated non-emergency venting. This is accomplished via ongoing evaluation of flare performance and FGRS loads.

Scheduling venting to avoid breaking the water seal will involve, for both small and large scale activities, ensuring venting occurs in a sequence which allows the refinery to maintain the water seal. Scheduling venting involves accurate estimates of venting volumes and durations.

Coordinating venting activities and adapting to schedule changes will be achieved by communication with the Flare Coordinator. This coordination is used to ensure monitoring of the FGRS and flare headers can guide decision making regarding discretionary venting to the flare header during planned maintenance.

Secondary Compressor staging and ensuring standby mode is important to ensure the water seal is not broken before the second Compressor is online to recover the additional Vent Gas load.

Prevention Measures

- 2001. The refinery has established preventative maintenance schedules for the FGRS Compressors and associated systems.
- 2002. The refinery has installed a third FGRS Compressor, one more than the two required by the CD, to increase reliability and flare minimization.
- 2003. To the extent possible, the refinery will coordinate FGRS maintenance to minimize flaring.
- 2004. Planned use of the flare header will be coordinated with the Flare Coordinator to minimize contributions to the flare header in a manner that maintains the water seal, to the maximum degree practicable.
- 2005. All discretionary venting due to planned maintenance to the flare header will be coordinated with the Flare Coordinator. The Flare Coordinator will inform operators of the Compressor capacity available and defer any venting to the header for which the Compressors do not have sufficient capacity, when feasible.
- 2006. The refinery may evaluate temperature impacts to the FGRS when planning venting events to avoid, when feasible, exceeding the temperature limit of the Compressors.
- 2007. The refinery has added consideration of the impact of changes on the FGRS to its MOC process. This will ensure any equipment, process control, training, procedural, or other changes do not have unforeseen adverse effects on the FGRS which could lead to flaring.

Schedule for Implementation

The procedures which require Prevention Measures #2001-2007 have been implemented.

6.4.2.2 Blowdown Rate and Coordination

Background

Many small vessels require regular blowdowns to purge accumulated liquid. Routine operational blowdowns are within the capacity of the FGRS and will be coordinated with the Flare Coordinator.

Prevention Measure

2008. The refinery will conduct vessel blowdowns, when possible, within the capacities of the FGRS Compressors and in coordination with the Flare Coordinator.

Schedule

The procedure updates required by Prevention Measure #2008 have been implemented.

6.4.2.3 Leak Prevention

Background

Flare connection leaks, including those from PRVs, represent unnecessary baseload to the FGRS Compressors for the North and South Flares. As such, the refinery has invested in leak detection equipment and procedures to ensure leaks are minimized.

Prevention Measure

2009. The refinery will utilize acoustic monitoring of all PRVs connected to the Flares and other connections known to have leaked or have a high risk of leaking to detect leaks as soon as practicable and develop corrective actions.

Schedule

The acoustic monitoring for the large, high pressure PRVs specified in Appendix C-2.2 of the CD have been completed. Corrective actions will be implemented in accordance with Paragraph 116 of the CD. The survey for all other hydrocarbon PRVs directed to a Covered Flare will be completed by Summer 2022. Corrective actions for these remaining PRVs will be completed during the first turnaround that occurs after eighteen months following the associated survey.

6.4.2.4 Cogen Optimization

Background

The Salt Lake City refinery has historically experienced Fuel Gas imbalances. Increasing the ability to productively consume excess fuel during these periods, thus reducing flaring potential, has been an ongoing effort.

Prevention Measure

2010. The refinery has taken two primary actions to improve the capability of the refinery to consume Fuel Gas by utilizing the cogeneration unit versus potentially flaring excess Fuel Gas.
- a. Turbine inlet evaporative air cooler optimization now at power generation or air inlet limit

- b. Variable volume heads were installed on J-80 to allow continuous operation below the rated full load amps of the motor and to improve available uptime and capability to consume Fuel Gas.

Schedule

The cogen optimizations outlined in Prevention Measure #2010 have been completed.

6.4.2.5 Fuel Gas Shedding SOI Updates

Background

The Salt Lake City refinery has historically experienced Fuel Gas imbalances. Reducing the frequency, magnitude, and flaring of these imbalances has been an ongoing effort. To reflect the current best practices at the refinery for avoiding and managing Fuel Gas long conditions, the refinery's Flare Gas Shedding Standard Operating Instruction (SOI) has been updated.

Prevention Measure

2011. The refinery has updated its Fuel Shedding SOI to ensure the following guidelines are met under Fuel Gas long conditions:
- a. Minimize natural gas imports as soon as feasible
 - b. Increase Fuel Gas demand through Fuel Gas consumer configurations, steam production, and other means
 - c. Adjust Fuel Gas production to match demand by altering operating conditions and rates, if necessary and feasible, for Fuel Gas producing units

Schedule

The SOI updates required by Prevention Measure #2011 have been completed.

6.4.2.6 Leak and Unknown Flow Troubleshooting Procedure

Background

As part of the effort to minimize the baseload flow to the FGRS Compressors and maintain as much of their capacities as possible for process upsets, the refinery has developed a procedure to identify the causes of increased baseload flow.

Prevention Measure

2012. The refinery has developed a troubleshooting process to address unknown increases in the baseload flow to the FGRS Compressors.

Schedule

The process required by Prevention Measure #2012 has been implemented.

6.4.2.7 Operator Training

Background

Operator decision making is critical to preventing and minimizing flaring. The refinery has therefore established training to ensure operators understand the regulatory and procedural requirements for flare operation and are equipped to maximize the effectiveness of equipment and procedures.

Prevention Measure

2013. The refinery has developed flare training to ensure operators are equipped to prevent or minimize flaring. The flare training includes training on the following topics:
- a. Consent Decree flaring requirements
 - b. NSPS Ja and MACT CC flare requirements
 - c. Flare Management Plan requirements
 - d. Flare operating principles
 - e. FGRS operation

Schedule

The training required by Prevention Measure #2013 has been established and will be continued as an ongoing effort.

6.4.3 Flare-Specific Prevention Measures for Flaring Due to Gas Quantity and Quality

6.4.3.1 Liquefied Petroleum Gas (LPG) Loading

Background

Vapors generated from railcar loading and unloading are routed directly to the flare system. Historically, routine loading and unloading has had the potential to exceed the FGRS seal capacity and lead to flaring.

Prevention Measure

2501. LPG railcar venting coordination will be managed by communication with the Flare Coordinator.

Schedule

Coordination of railcar venting during loading/unloading as required by Prevention Measure #2501 has been implemented.

6.4.3.2 Portable Flow Indication

Background

To facilitate flare header flow monitoring and minimization, the refinery is evaluating the purchase of portable flow monitors. While these monitors are not intended to meet the accuracy requirements for actual flare flow monitoring under Paragraph 121, they are useful for identifying flow trends in the flare headers and subheaders.

Prevention Measure

2502. The refinery is evaluating the purchase of portable flow monitors to aid in flare header flow monitoring and minimization.

Schedule

Implementation of Prevention Measure #2502 is currently under evaluation.

6.5 Evaluation of Flaring Due to Recurrent Failure of Equipment and Reliable Operation

6.5.1 Evaluation of Flaring Due to Recurrent Failures

6.5.1.1 Approach

The evaluation of flaring due to recurrent failures included the evaluation described in Section 6.2 above, as well as the requirements specified by Paragraph 127.j.iii.

Paragraph 127.j.iii requires the evaluation of flaring due to the recurrent failure of air pollution control equipment, process equipment, or a process to operate in a normal or usual manner. The evaluation must consider the adequacy of existing maintenance schedules and protocols for such equipment. A failure is "recurrent" if it occurs more than twice during any five year period as a result of the same root cause.

6.5.2 Refinery-Wide Prevention Measures for Flaring Due to Recurrent Failures

6.5.2.1 Power Reliability

Background

In the past few years, electric power outages were a significant cause of process upset flaring. Recognizing this, the Salt Lake City Refinery has undertaken multiple projects to improve electrical reliability including:

- Converting a single bus system at the Rocky Mountain Power (RMP) substation to a ring bus system
- Creating two functionally independent Cogen systems
- Adding redundant circuits to all major power distribution systems
- Improving Cogen reliability by debugging protection and control settings
- Building a new main substation
- Improving preventative maintenance procedures
- Improving current transformer (CT) testing
- Improving ground fault detection
- Reducing single points of failure

The refinery has historically been served from a single overhead 46 kilovolt distribution line with single taps branching off to the various substations throughout the plant. The four new medium voltage substations installed at the refinery include redundant feeders, high speed protective relays and automatic transfer schemes. The substations are also supplied by armored tray cables that reduce exposure to lightning, faulting, and other hazards that often lead to power upsets and to flaring. These new substations have been commissioned and will serve anticipated future process loads.

Prevention Measures

- 3001. The refinery has completed the electrical power infrastructure projects cited above to improve power reliability and minimize flaring due to local or refinery-wide power outages.
- 3002. The refinery is evaluating upgrades to a more reliable 138 kV power supply system.

Schedule

The projects required by Prevention Measure #3001 have been completed.

Implementation of Prevention Measure #3002 is currently under evaluation.

6.5.3 Flare-Specific Prevention Measures for Flaring Due to Recurrent Failures

6.5.3.1 Wet Gas Compressor Reliability

Background

The fluidized catalytic cracking unit (FCCU) at the Tesoro Salt Lake City Refinery has experienced unstable operations that have historically led to Shutdowns resulting in flaring when the downstream Wet Gas Compressor (WGC) shuts down.

Prevention Measure

- 3003. The refinery has made improvements to increase reliable operation of the FCCU and WGS and to reduce WGS Shutdowns. These include:
 - a. The vent to Flare valve was tuned to respond more slowly during WGS surge conditions so that feed gas is not diverted away from the Compressor, preventing a Shutdown.
 - b. The WGS minimum flow line was steam traced and insulated to reduce amounts of liquid that can condense and potentially carry over to fractionator overhead.
 - c. Line service was changed from intermittent flow to continuous flow to eliminate liquid accumulations in the line.
 - d. FCCU operators now measure the temperature of the minimum flow line on rounds to ensure that it stays above dew point temperature of the gas.

Schedule

Implementation of Prevention Measure #3003 has been completed.

7.0 Minimization Assessment

The Salt Lake City Refinery has conducted a minimization assessment as required by Paragraph 127.b. This assessment considered the capital and annual operating costs, technical feasibility, secondary environmental impacts, and safety aspects of each potential change.

7.1 Description of Minimization Assessment Process

The Salt Lake City Refinery conducted the minimization assessment by building on the evaluations conducted for the 40 CFR Part 60 Subpart Ja (Subpart Ja) FMP. Because the flare connections were mapped and reviewed during the Subpart Ja evaluation, the approach for this minimization assessment was to apply lessons learned since submission of the Subpart Ja FMP, including evaluation of flaring events, and leverage the Prevention Measures evaluations described in Section 6.0 above.

7.2 Acoustic Monitoring on all Hydrocarbon PRVs

As required by Paragraph 127.b.ii, the Salt Lake City Refinery has established a plan and schedule for conducting acoustic monitoring on all hydrocarbon PRVs directed to the North and South Flares. The Initial PRV Leak Survey required by Paragraph 116 for large, high pressure PRVs listed in Appendix C-1.2 of the CD has been completed. The monitoring schedule for all other PRVs directed to the Flare, based on their inlet diameters, is described in Section 6.4.2 above.

8.0 Reductions Based on Root Cause Analyses

This section is a placeholder for the Paragraph 128.a and b requirements to conduct a review of all Root Cause Analysis reports pursuant to 40 CFR Part 60 Subpart Ja or the CD to determine if reductions can be achieved through any corrective action. It also requires that good cause be provided for any proposed extension to the implementation schedule of any proposed project in this Initial FMP to drive further flaring reductions. This section will be updated as applicable in the first annual FMP update to be submitted by April 1, 2018.

9.0 Taking a Covered Flare Out of Service

The CD, under Paragraph 127.i, requires identification of any Covered Flare that the refinery intends to take out of service, including the date for completion of the decommissioning. Taking a Covered Flare “out of service” means physically removing piping in the Flare header or physically isolating the piping with a welded blind so as to eliminate direct piping to the Covered Flare. The Salt Lake City Refinery does not intend to take the North and South Flares out of service.

Appendix A

Flare Management Plan Revision Details

Table A-1 History of revisions

Revision	Date	Summary of Changes
1.0	April 1, 2017	Initial CDFMP

Table A-2 Changes for next revision

Date	Summary of Changes

Appendix B

Appendix C-1.11 Flare Connection List and Flare Maps

Tesoro Salt Lake City Flare Connection List

Flare Process Unit Header	Flare	Flow (mscfd)	Sources	Detailed Source Description
Q-Alky1	North	0	3 Control Valves 8 Manual Valves 13 PSVs 15 Pumpouts 3 Samples 7 Seal Pots	F-446 - PSV 6-82
				F-447 - PSV 6-83
				J-448 - Manual
				F-403 - PSV 6-18
				C-402A Sample Alky Feed & F-452 Out - Sample
				F-402 - PSV 6-17
				F-426 - PSV 6-39
				F-402 - DIB Sample Point
				F-426A Chroma - GC Sample
				C-402B - PSV 6-59
				C-402A - PSV 6-58
				F-452 - PSV 6-97
				F-427A - PSV 6-40
				F-427B - PSV 6-44
				F-427A/B/C/D Vent (propane bullets) - Manual
				F-453A/B J-929s Seal Pots - Seal Pot
				J-929A/B - Manual
				F-406 - PSV 6-21
				F-409 - PSV 6-25
				C-415 - PSV 6-84
				J-411A - Seal Pot
				J-417 - Manual
				J-409a - Manual
				J-408A - Seal Pot
				J-408 - Seal Pot
				J-411 - Pump Seals
				J-407A - Manual
				Reactor Effluent Sampler - Manual
				J-407 - Manual
				J-406A - Seal Pot
				J-406 - Seal Pot
				F-402 - Pressure Valve
				F-426A - Pressure Valve
				F-452 - Pressure Valve
				F-405W - Manual
				F-406W - Manual
				C-415 - Manual
				F-409W - Manual
				F-407W - Manual
				C-414 - Manual
				E-404 - Manual
				F-415B - Manual
				C-401 - Manual
				C-408 - Manual
				E-402 - Manual
				C-406A - Manual
				E-401 - Manual
				C-406B - Manual
				F-325 - LCV-8259 (Poly)
Q-Alky2	North	0	1 PSV	F-415B - PSV 6-35
Q-Alky3	North	3.8	1 Control Valve	F-415B - PCV 641B
			1 Manual Valve	J-422/F415B - Manual

Flare Process Unit Header	Flare	Flow (mscfd)	Sources	Detailed Source Description
Q-Alky4	North	31.7	13 Manual Valves 18 PSVs 1 Seal Pot 1 Sweep	J-413G SS Tubing - Pump Seal
				J-413G - Manual
				J-413F - Manual
				J-413C - Manual
				J-413B - Manual
				J-413E - Manual
				J-413A - Manual
				F-410A/B - Manual
				F-429 Pressure Controller - Manual
				C-412B SS - Manual
				C-412A SS - Manual
				C-402 A/B TS - Manual
				F-436 - Manual
				F-445/J-435/J-435B - Manual
				Nitrogen Purge - Sweep
				F-442 - PSV 6-80
				F-434 - PSV 6-77
				F-401D - PSV 6-16 Bypass
				F-401C - PSV 6-14 Bypass
				F-401D - PSV 6-16
				F-401D - PSV 6-15
				F-401C - PSV 6-14
				F-401C - PSV 6-13
				F-401B - PSV 6-12 Bypass
				F-401A - PSV 6-10 Bypass
				F-401B - PSV 6-12
				F-401B - PSV 6-11
				F-401A - PSV 6-10
				F-401A - PSV 6-11
				F-44B - PSV 6-67
				F-445 - PSV 6-81
				F-436 - PSV 6-78
				F-411 - PSV 6-28
Q-Alky5	North	NA (Less than 6" header)	3 Manual Valves	J-439/J-438/J-437 - Manual
Q-Alky6	North	NA (Less than 6" header)	1 Manual Valve	F-446 - Manual
				F-403 - Manual
Q-BEN1	South	5.1	2 Drains 12 PSVs 2 Samples 9 Seal Pots 1 Sweep 1 Other	P-503B - Plan 52 Seal
				BSU Stab BTM - Sample
				D-509 H2 - Sample
				BSU C-501 - PSV 5-09
				BSU E-509 TS - PSV 5-11
				BSU E-514 TS - PSV 5-02
				BSU C-502 - PSV 5-01
				BSU D-508 - PSV 5-08
				P-506A - Plan 52 Seal
				P-506B - Plan 52 Seal
				P-507A - Plan 52 Seal
				P-507B - Plan 52 Seal
				BSU Emergency Depressuring - Pressure Valve
				P-502A - Plan 52 Seal
				BSU D-504A - PSV 5-05
				BSU D-504B - PSV 5-06
				BSU D-507 - PSV 5-07
				BSU D-511 - PSV 5-13
				BSU E-504 SS - PSV 5-15
				BSU H2 DDU - PSV 5-04
				BSU R-501 - PSV 5-19
				D-513 - Close Drain Receiver
				Nitrogen Purge Rotometer - PCV250162
				P-501A - Plan 52 Seal
				P-501B - Plan 52 Seal
				P-502B - Plan 52 Seal
				R-501 - Bottom Drain

Flare Process Unit Header	Flare	Flow (mscfd)	Sources	Detailed Source Description
Q-BLR/Poly1	North	NA (Less than 6" header)	3 PSVs 1 Seal Pot	E-323 - PSV 8-36 BLR System - PSV 15-103/15-89/15-90/15-91 F-848/849 - PSV 15-101/15-102 J-988 A/B - Seal Pot
Q-BLR1	North	NA (Less than 6" header)	2 Control Valves 5 Manual Valves 16 PSVs 1 Sweep 1 Vent	J-929A/B - PSV 15-59 BLR - PSV 15-62 Propane to C-402 - PSV 15-69 F-872 - PSV 15-58 J-952 - Manual Vent F-872 - HCV-149 E-818 - PSV 15-76 E-818 - Hot Propane J-951A to Loading Spot - PSV 15-54 J-951A to Tk-155 - PSV 15-52 Butane Rack - PSV 15-88 J-954 Compressor Packing Vents - PSV 15-84,85,86,87 F-870A - Manual Drain J-951 A/B - Manual F-871 - PSV 15-53 F-871 - HCV-135 Butane Loading - PSV 15-56,57 J-852A/B - PSV 15-55 J-852A/B - PSV 15-51 J-852/J-876/J-830/Tk 329 - Manual Vent/Drain Nitrogen Purge - Sweep iC4 to Alky - PSV 15-71 iC4 to Alky - PSV 15-70 J-813A/B/C - Manual Drains Rail Loading Arms C3 and C4 - PSV 15-61,62,63,64,65,66 TK-155 - Vent
Q-BLR2	North	NA (Less than 6" header)	1 Manual Valve 2 PSVs 2 Others	Proposed Location for New Loading Rack 1-6 (716 Track) - Future TK 155 - PSV 15-72 Load Rail spots 1-4 (715 Track) Truck Rack, Truck Island - Loading Rack V-917 - Manual Drain V-917 - PSV 13-36
Q-COB1	North	NA (Less than 6" header)	1 Manual Valve	F-51 COB FG KO Drum - Manual Drain
Q-COB2	North	NA (Less than 6" header)	1 Control Valve 1 PSV	COB - PCV-120270 F-51 - PSV 3-9
Q-COG1	North	NA (Less than 6" header)	5 Manual Valves 5 PSVs	East/West Duct Burner Drains - Drains V-957 - PSV 13-66 V-957 COGEN FG KO drum - Manual Drain J-82 Gas Fuel Filter - Manual Vent J-81 Gas Fuel Filter - Manual Vent V-935 - PSV 13-67 V-954/V-051/V-935 - Manual Vents V-953 - PSV 13-64 E-951 TS - PSV 13-65 V-951 - PSV 13-63
Q-DDU1	South	NA (Less than 6" header)	1 Manual Valve	DDU P-612A - Manual Blowdown
Q-DDU2	South	NA (Less than 6" header)	1 Manual Valve	DDU P-61B - Manual Blowdown

Flare Process Unit Header	Flare	Flow (mscfd)	Sources	Detailed Source Description
Q-DDU3	South	56.2	2 Control Valves 3 Manual Valves 22 PSVs 2 Rupture Discs 1 Sample 3 Seal POTS 2 Sweeps 8 Vents 3 Others	DDU D-627 - PSV 26-07
				DDU D-627 - Bridle Vent
				E-670 TS - DDU RD-204
				DDU C-612 - PSV 26-20
				DDU C-612 - Bridle Vent
				DDU RD-26-202 - E-657 TS
				DDU K-686 - PSV 26-13
				DDU K-686 - PSV 26-12
				DDU K-686 - PSV 26-26
				DDU K-686 - PSV 26-14
				DDU D-631 - PSV 26-11
				DDU D-630 - PSV 26-08
				DDU D-628 - PSV 26-24
				DDU D-624 - PSV 26-05
				DDU K-686 & K-686A - Packing Vents
				DDU K-686 & K-686A - Casing Vent
				DDU D-633 - Bridle Manual Vents
				DDU K-686 - 1st Stage Depressure-628 Vent
				DDU D-633, K-687 - Drain & Vent
				DDU Startup/Shutdown Normally Routed to Fuel Gas - Pressure Valve
				DDU D-633 Normally Routed to F-12 - Pressure Valve
				DDU D-632 - Manual Vent
				DDU E-660 - Manual Vent
				DDU C-611 - PSV 26-15
				DDU P-609 - Seal Flush
				DDU P-607/607A - Seal Flush
				DDU E-658 SS - PSV 26-60
				DDU P-601A - Seal Flush
				DDU R-604 - Sample Station
				DDU D-635 - PSV 26-34
				DDU D-622 - Automatic Depressuring Valves
				Natural Gas Flare Gas Purge - Sweep
				DDU D-623 - PSV 26-04
				DDU D-621 - PSV 26-03
				DDU D-625, D-623, C-610 - Manual Bridle Vents
				DDU D-620 Blanket Gas (N2) - N2 Purge
				DDU D-620 - PSV 26-01
				DDU D-627 - PSV 26-07
				DDU D-627 - Bridle Vent
				DDU C-216 - PSV 26-20
				DDU C-612 - Bridle Vent
				DDU K-686A - Manual and Packing/Casing Vent
				DDU K-686A - PSV 26-49
				DDU D-644 - PSV 26-47
				DDU D-643 - PSV 26-46
				DDU K-686A - PSV 26-48
Q-FCU1	North	NA (Less than 6" header)	1 Manual Valve 1 Vent	F-15 FCC FG KO Drum - Manual Drain E-4 FCC SW Flash Drum - Process Vent
Q-FCU2	North	NA (Less than 6" header)	1 Manual Drain	F-16 - Manual Drain

Flare Process Unit Header	Flare	Flow (mscfd)	Sources	Detailed Source Description
Q-FCU3	North	NA (Less than 6" header)	11 Manual Valves 2 PSVs 2 Pumpouts 1 Sweep 1 Other	C-06SS - PSV 1-54 V-917 Sweet Gas Purge - Sweep FCC Pumpout Header - Header C-03B - PSV 1-55 C-05 SS - Manual Drain C-05 TS - Manual Drain C-09 - Manual Drain LCO Wash to C-13s - Manual C-13 - Manual Drain C-16 TS - Manual Drain Slurry Line - Manual Drain C-131B TS/C-132C TS - Manual Drain C-114B TS/C-116B TS - Manual Drain J-19A/J-19B - Manual Drain C-06 TS - Manual Drain C-06 SS - Manual Drain C-03A/B - Manual Drain
Q-FCU4	North	0	1 Drain 2 PSVs	F-12W - Drain C-04 1/C04 2 TS - PSV 1-23 F-12 - PSV
Q-GHT1	North	92.1	4 Control Valves 9 Manual Valves 9 PSVs 1 Sample 7 Seal Pots 1 Sweep 2 Others	Feed Sampler Vent - Manual Vent P-701A/701B Seal Pot - Seal Pot/Seal D-701 - PSV 7-01 D-706 - Manual Drain D-706 - PSV 7-08 D-705 Overhead - PCV270180 P-703B/A Seal Pot - Manual Vent P-703A Seal Pot - Manual Vent P-703A/B - Manual Vents F-701 Fuel Gas - XV270042C Vent F-701 Pilot Gas - XV270046C Vent D-702 Bottoms - SW Boot D-702 Bottoms - PSV 7-02 D-702 - XV-270101 R-701 Bottoms - Manual Vent D-705 Waterboot - Manual Drain C-702 - PSV 7-07 C-702 Bottoms - Manual Drain C-701 - PSV 7-03 D-703 Bottoms - Manual Drain SP/14 Sample Point Vent - Sample D-704 - PSV 7-04 K701A D-709 - PSV 7-05 D-710 - PSV 7-06 D-711 - PSV 7-09 K-701A - Outboard Vent K-701A - Inboard Vent K-701B - Inboard Vent K-701B - Pressure Packing Vent K-701B - Outboard Vent K-701A (D-707/D-709) - Manual Vent K-701B (D-708/D-710) - Manual Vent K-701A - Pressure Packing Vent Natural Gas Purge - Purge
Q-Iso1	North	NA (Less than 6" header)	1 Vent	F-418 Vent - Vent
Q-N2C1	South	NA (Less than 6" header)	1 Manual Valve	N2C V-106 - Manual Blowdown
Q-N2C2	South	NA (Less than 6" header)	4 PSVs	N2C E-119SS - PSV 9-60 N2C V-115 - PSV 9-37 N2C E-105B SS - PSV 9-61 N2C E-107A SS - PSV 9-75

Flare Process Unit Header	Flare	Flow (mscfd)	Sources	Detailed Source Description
Q-N2C3	South	14.4	5 Manual Valves 23 PSVs 1 Sweep 1 Vent	E-109A/B/C/D - Manual Blowdown
				N2C V-108/V-114/V-109 - Manual Pumpout
				N2C H-101 Coils - Manual Pumpout
				Fuel Gas Purge Rotometer - Sweep
				N2C V-105 - PSV 9-6
				N2C V-120 - PSV 9-40
				N2C V-112 - PSV 9-38
				N2C V-102 - PSV 9-3
				N2C V-102 - PSV 9-4
				N2C V-102 - PSV 9-5
				N2C V-102 - PSV 9-66
				N2C V-102 - PSV 9-68
				N2C E-108 - PSV 9-49
				N2C E-106A SS - PSV 9-56
				N2C V-112, E-117, K-100 - Manual Blowdown
				N2C P-119A/B, V-113A - Manual Blowdown
				N2C V-113A - PSV 9-51
				N2C E-120 SS - PSV 9-53
				N2C V-106 - PSV 9-1
				N2C V-101 - PSV 9-2
				N2C V-917 - Excess FG
				N2C V-123 - PSV 9-74
				N2C F-65 - PSV 11-27
				N2C F-15 - PSV 11-3
				N2C V-108 - PSV 9-36
				N2C E-116A/B - PSV 9-64
Q-Poly1	North	NA (Less than 6" header)	1 Control Valve 1 PSV	N2C F-11 - PSV 11-23
				N2C V-116 - PSV 9-33
Q-Poly2	North	NA (Less than 6" header)	1 Control Valve 2 Manual Valves 1 Sample	N2C V-122 - PSV 9-73
				N2C V-121 - PSV 9-69
Q-Poly3	North	0	2 Control Valves 4 Manual Valves 5 PSVs 1 Sample	F-322 - PSV 6-57
				Nitrogen - PCV 8278
				F-320W/F-321W - Manual
				F-310 Poly/Debut - Sample Point Level Gauge
				F-302/F-303 - Manual
				F-310W (PolyDebut OvH) - LCV 8103
				F-302 - PSV 8-7
				F-303 - PSV 8-8
				FCV-8103 - Sample Point
				Dethanizer OVH Chromatograph - FCV-8205
				F-310 (Poly Debut OVH) - PCV-8101
				F-320 - PSV 8-11
				J-330B - Manual
				F-321 LC/LG - Manual
				J-331A/B Seal Pot - Seal Pot/Seal
Q-Poly4	North	0	4 Manual Valves 7 PSVs	F-444 Ethyl Mercaptan System - Mercaptan Dosing
				F-324 - PSV 8-34
				F-325 - PSV 8-35
				J-330A/J-331 - PSV 8-22,23
				J-302B - Manual
				J-304 Discharge - Manual
				J-304 Suction - Manual
				C-309 TS - PSV 8-28
				C-309 SS - PSV 8-27
				C-307 - PSV 8-13
Q-Poly5	North	NA (Less than 6" header)	1 Other	E-321 - PSV 8-6
				C-321 - PSV 8-15
Q-Poly6	North	NA (Less than 6" header)	2 Others	C-322A/B - Manual
				F-310 - PSV 8-30
Q-TF1	North	NA (Less than 6" header)	1 Vent 2 Manual Valves	F-322 - Sample Point Upstream of FCV-8206
				UFU V-6 Flare KO Drum - KO Drum
				F-321 DeC2 OVH - OOS
				J-852A/B - Manual
				TK-305/306/329 - Control Valve Vent
				J-830 Knockout Pot - Manual

Flare Process Unit Header	Flare	Flow (mscfd)	Sources	Detailed Source Description
Q-UFU1	South	0	1 Control Valve 16 Manual Valves 12 PSVs 1 Vent	UFU C-15 TS - Manual Pumpout
				UFU C-10 SS - Manual Pumpout
				UFU C-15 SS - Manual Pumpout
				UFU E-5 - Manual Pumpout
				UFU J-8 - Manual Pumpout
				UFU J-15A - Manual Pumpout
				UFU J-14C/D - Manual Pumpout
				UFU J-12A/B - Manual Pumpout
				UFU P-2A/B - Manual Pumpout
				UFU J-10A/B - Manual Pumpout
				UFU C-8 TS - Manual Pumpout
				UFU E-75 SS - Manual Pumpout
				UFU C-16 SS - Manual Pumpout
				UFU C-8 - PSV 11-4
				UFU E-6 - PSV 11-28
				UFU E-6 - PSV 11-11
				UFU E-5 - PSV 11-10
				UFU C-15 - PSV 11-18
				PCV020306 F-4 PREFRAC OVH - Pressure Valve
				F-5 UFU FD DRUM VENT - Vent
				UFU F-5 - PSV 11-8
				UFU F-3 - PSV 11-7
				UFU V-15 - PSV 11-16
				UFU F-10 - PSV 11-17
				UFU F-13 - PSV 11-13
				UFU C-7B - Manual Pumpout
				UFU C-13 SS, C-12 SS - Manual Pumpout
				UFU C-7A - Manual Pumpout
				UFU C-13 - PSV 11-30
				UFU F-14 - PSV 11-12
Q-UFU2	South	NA (Less than 6" header)	1 PSV 2 Others	UFU V-8 - PSV 10-31
				F-321 DeC2 OVH - OOS
				North Flare Connection - V-917/Cogen
Q-UFU3	South	NA (Less than 6" header)	5 PSVs	UFU RX-4 - PSV 10-22
				UFU RX-3 - PSV 10-21
				UFU RX-2 - PSV 10-20
				UFU RX-1 - PSV 10-19
				UFU RX-5 - PSV 10-23
Q-UFU4	South	26.6	1 Control Valve 9 Manual Valves 6 PSVs 1 Pumpout 1 Sweep 1 Other	UFU F-1 Convec - PSV 10-5
				UFU V-15 - PSV 10-9
				UFU V-1 - Manual Pumpout
				UFU V-8 Overhead - Manual Vent
				UFU V-12 - Manual Blowdown
				UFU V-11 - Manual Blowdown
				UFU K-1A/B - Manual Blowdown
				UFU V-8 - Purge Gas (FG) Rotometer
				UFU V-8 - PSV 10-14
				UFU V-4 - PSV 10-15
				UFU P-1A/B - Manual Pumpout
				UFU P-73 - Manual Pumpout
				UFU P-3B - Manual Pumpout
				UFU V-2 - PSV 10-13
				TIC079 - E-19 TS Pumpout
				UFU TCV030110 - E-19 TS Pumpout
				UFU Regen Header - HCV032062
				UFU Upper Blowdown Header - Header
				UFU E-2 - PSV 10-4

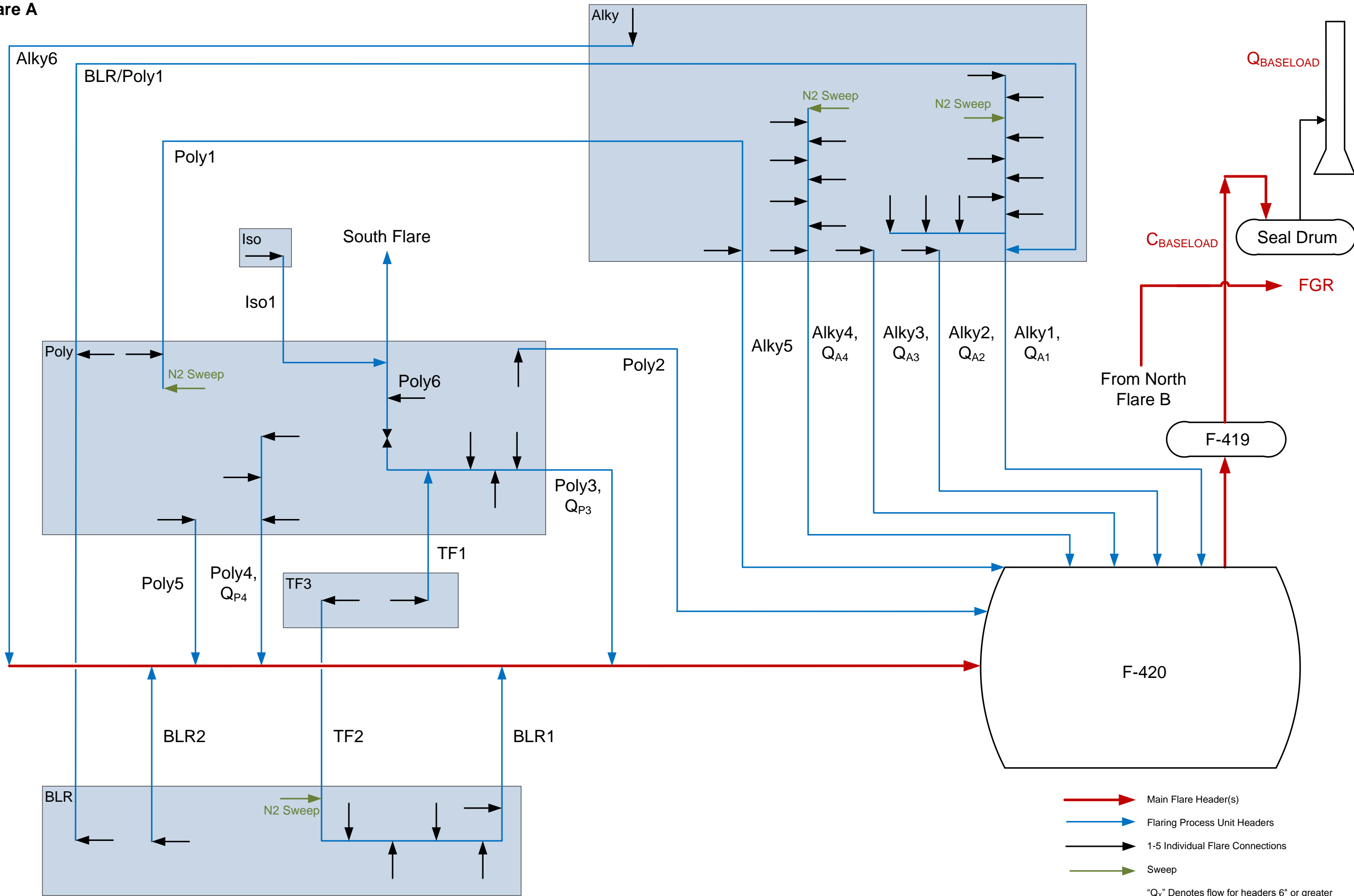
Flare Process Unit Header	Flare	Flow (mscfd)	Sources	Detailed Source Description
Q-UFU5	South	0	14 Manual Valves 7 PSVs	UFU V-51 - Manual Pumpout
				UFU E-51A TS/SS - Manual Pumpout
				UFU R-51 - Manual Pumpout
				UFU R-52 - Manual Pumpout
				UFU E-51C SS - Manual Pumpout
				UFU E-22B - Manual Pumpout
				UFU E-80 - Manual Pumpout
				UFU E-77 - Manual Pumpout
				UFU P-51 - Manual Pumpout
				UFU V-4 - Manual Pumpout
				UFU V-8 BTM/V-3W - Manual Pumpout
				UFU E-20B/V-52 - Manual Pumpout
				UFU P-72A/B - Manual Pumpout
				UFU P-52A/B - Manual Pumpout
				UFU E-77 - PSV 10-46
				URUF V-52 - PSV 10-48
				UFU V-80 - PSV 10-71
				UFU R-51 - PSV 10-72
				UFU R-52 - PSV 10-73
Q-UFU6	South	NA (Less than 6" header)	1 Drain 1 Seal Pot	UFU P-509A/B - Suction Pipe Drain
				DDU P-509A/B - Plan 52
Q-VRU1	North	NA (Less than 6" header)	1 Drain 1 Manual Valve	VRU/FCC Pump - Vents/Drains
				F-110 East/West Pump Room - Manual Vent

Flare Process Unit Header	Flare	Flow (mscfd)	Sources	Detailed Source Description
Q-VRU2	North	1.5	1 Control Valve 9 Drains 4 Manual Valves 19 PSVs 1 Pump 2 Samples 6 Seal Pots 1 Sweep 1 Vent	F-102 - PSV 2-13
				C-102 SS - PSV 2-60
				C-132C TS - PSV 2-49
				C-09 SS - PSV 2-72
				E-103 - LAL 110328
				C-09A SS - PSV 2-66
				C-107/D, 107C-1,2,3,4 - Manual Vent
				C-114B TS - PSV 2-45
				C-11 - PSV 2-64
				C-115A/B SS - PSV 2-89
				E-105 L110535 - Manual Vent
				E-105 OVH - Sample
				E-108 - PSV 2-8/2-9
				E-109 - PSV 2-10/11 and PSV 2-52
				J-154A/B PPs - Pump
				E-106 - Manual Drain
				C-116 - PSV 2-91
				F-101A - PSV 2-81
				E-107 - PSV 2-7
				F-105A - PSV 2-84
				FCV-110518/C-109A - Sample
				C-120A SS - PSV 2-62
				J-127A/B - Seal Pot
				F-101A - Drain
				J-100A - PCV11385
				J-100A - Dry Gas Seal
				J-110 B/C - Seal Pot
				J-104B/C - Seal Pot
				F-141 Vent & F-141/LG 111392 Drain - Manual
				C-124A/B SS - Drain
				J-100 Discharge - PSV 2-18
				C-149A/B SS - Drain
				C-157A/B SS - Drain
				J-10/103B - Seal Pots
				E-110 - PSV 2-86
				C-152s SS/C-151s SS/C-150s SS/C-158/C-159 SS - Drains
				E-111 - PSV 2-87
				F-102 - PSV 2-82
				F-102WB - Drain
				F-141 WB/LG 110321 - Drain
				E-111/C-156A SS/TS & LG111335 - Drain
				J-150A/B - Casing Drains
				J-150A/B - Seal Pots
				V-917 Sweet Gas Purge (#2) - Sweep
				F-15 FCC FG DO Drum - Manual Drain
Q-VRU3	North	0	1 Control Valve 6 PSVs 1 Other	F-103 - PSV 2-83
				C-129 SS - PSV 2-88
				C-131 C TS - PSV 2-48
				F-101 - PSV
				J-100 Suction - PCV101231
				F-110 East/West Pump Room - Pump Vent Drum
				F-101 - PSV 2-12
				F-109 - PSV 2-15

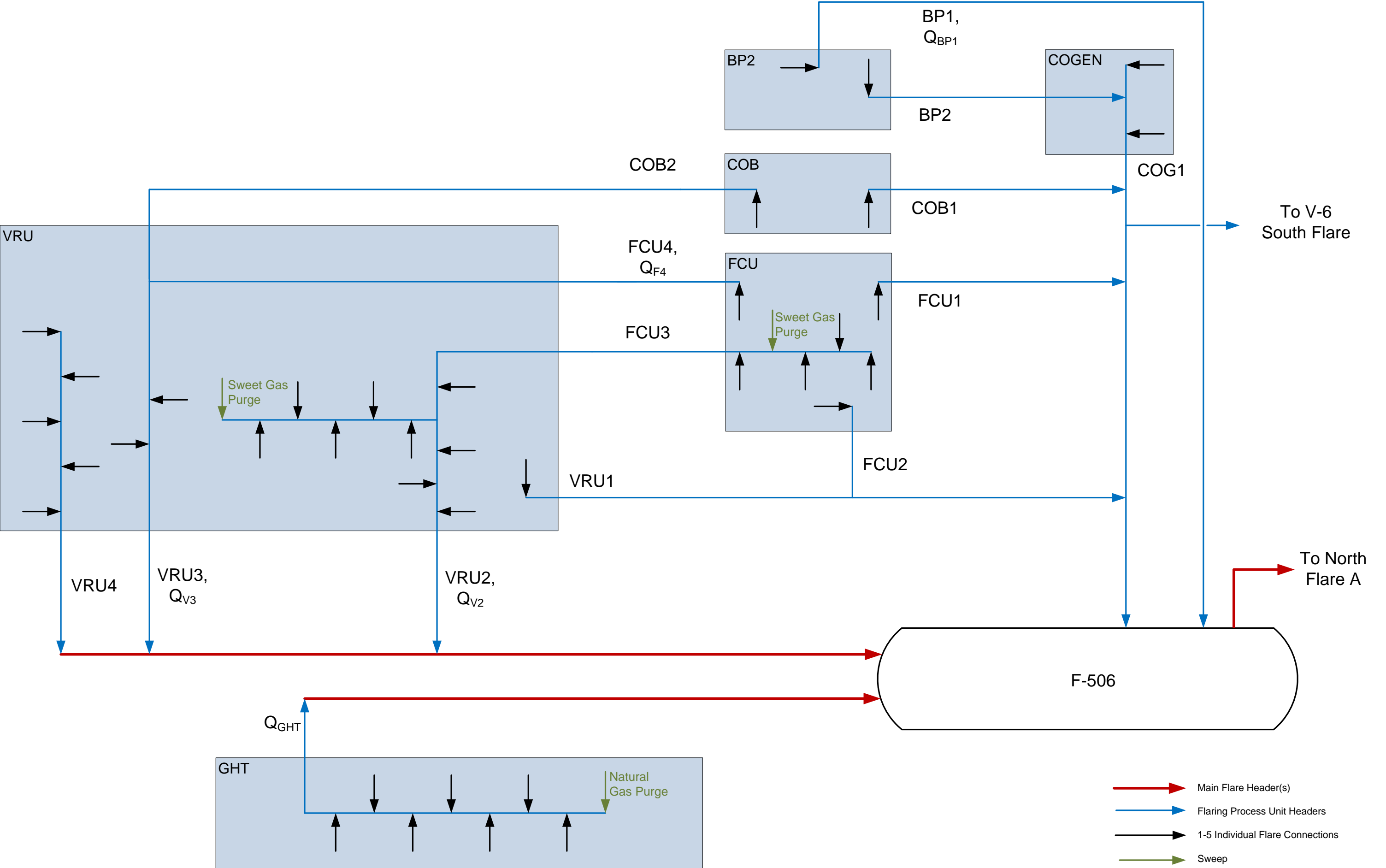
Flare Process Unit Header	Flare	Flow (mscfd)	Sources	Detailed Source Description
Q-VRU4	North	NA (Less than 6" header)	21 Manual Valves 1 PSV 2 Pumpouts 1 Other	F-109 - Manual Drain
				VRU Pumpout Header - Header
				E-106 - Manual Drain
				C-117S - Manual Drain
				F-105A L111422 - Manual Drain
				C-120A SS - Manual Drain
				F-129 - PSV 2-50
				Nitrogen Purge - Manual
				C-113 SS - Manual Drain
				C-109A SS - Manual Drain
				F-105A/F-105W - Manual Drain
				E-105 - Manual Drain
				C-114/C-114B SS - Manual Drain
				C-129 SS/TS - Manual Drain
				C-108A SS/C-108B SS - Manual Drain
				F-103W - Manual Drain
				C-105-3/C-104 A/C-105-1 T/C-105-3 - Manual
				C-131C SS - Manual Drain
				C-131B SS - Manual Drain
				C-101A SS - Manual Drain
				C-102 SS - Manual Drain
				C-101B SS - Manual Drain
				F-102W - Manual Drain
				C-103 2/ 105-2/ 105-3/ 104A - Manual Drain
				C-132B SS/C-132C SS/E102 - Manual Drain

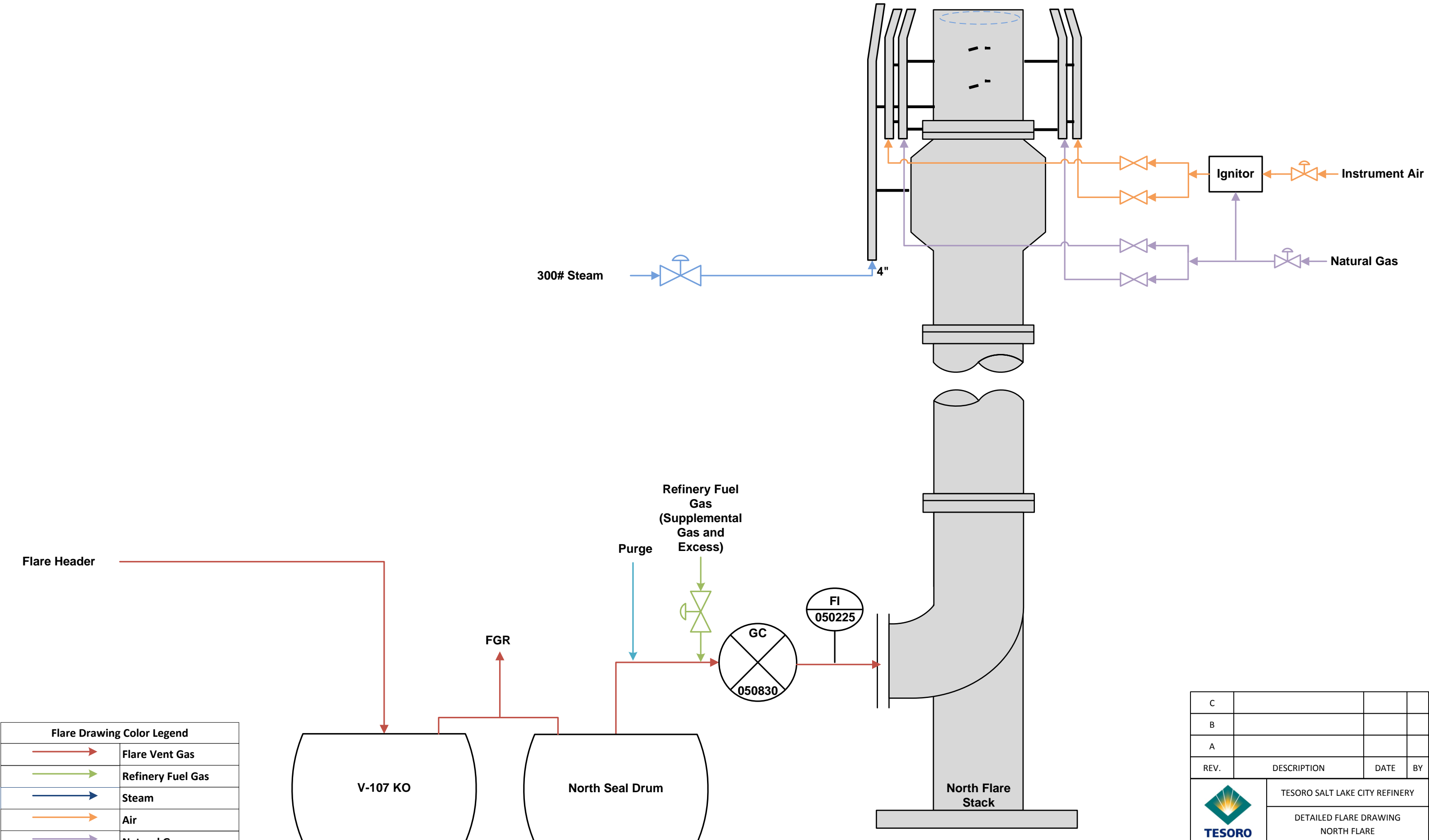
North Flare







North Flare A




North Flare B





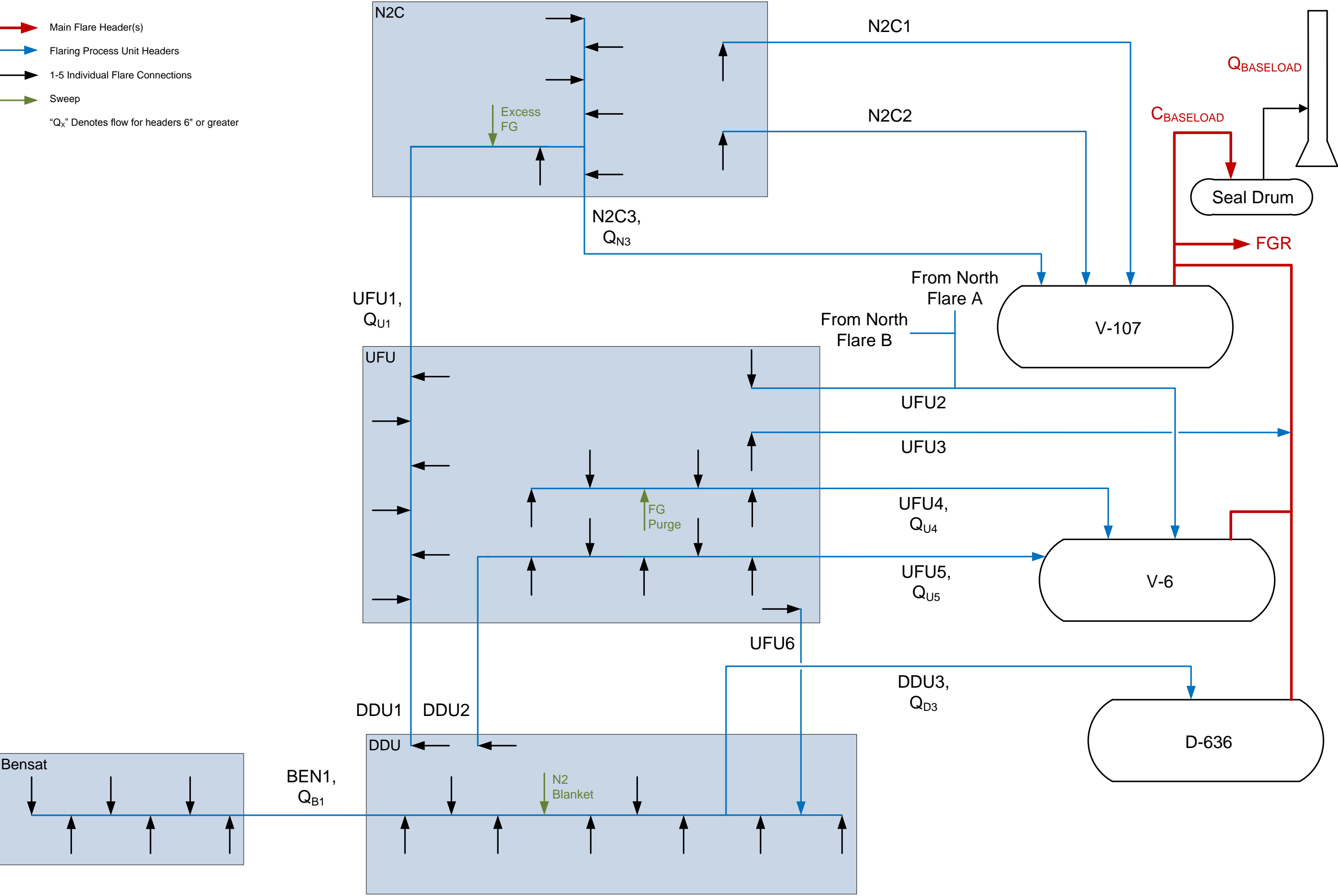
Flare Drawing Color Legend	
	Flare Vent Gas
	Refinery Fuel Gas
	Steam
	Air
	Natural Gas
	Nitrogen







C			
B			
A			
REV.	DESCRIPTION	DATE	BY
		TESORO SALT LAKE CITY REFINERY	
		DETAILED FLARE DRAWING NORTH FLARE	
		DWG NO XXX-XX-XXX-XXX	C
SCALE: NONE		SHEET	1 OF 1

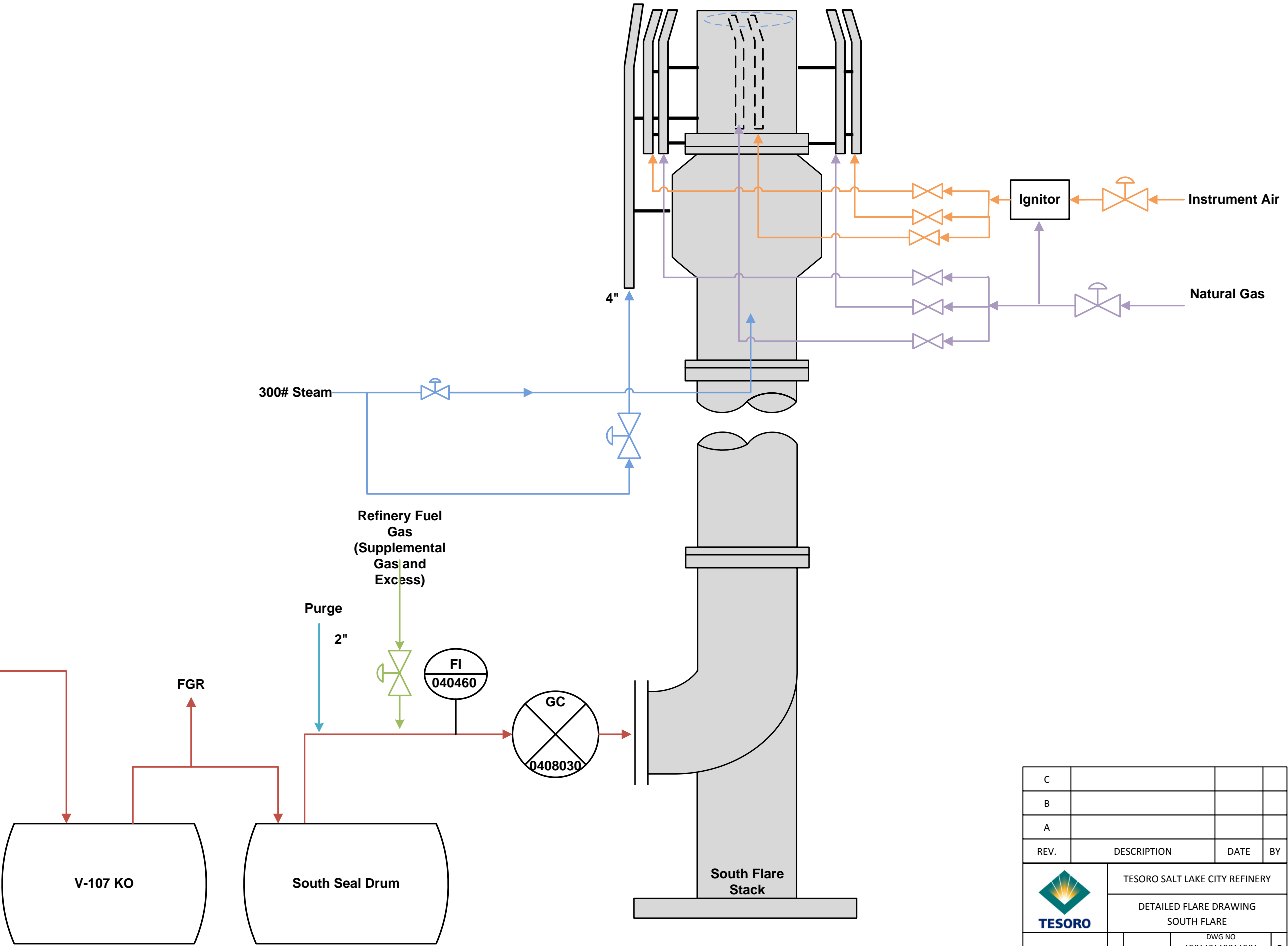
South Flare


South Flare

- Main Flare Header(s)
- Flaring Process Unit Headers
- 1-5 Individual Flare Connections
- Sweep
- "Q_x" Denotes flow for headers 6" or greater



Flare Drawing Color Legend	
	Flare Vent Gas
	Refinery Fuel Gas
	Steam
	Air
	Natural Gas
	Nitrogen



C			
B			
A			
REV.	DESCRIPTION	DATE	BY
		TESORO SALT LAKE CITY REFINERY	
		DETAILED FLARE DRAWING SOUTH FLARE	
		DWG NO XXX-XX-XXX-XXX	C
	SCALE NONE	SHEET	1 OF 1

Appendix C

Consent Decree Cross Reference Table

Table C - 1 Consent Decree Cross Reference Table

Citation	Consent Decree Requirement	Location
127(a)	A listing of all refinery Flaring Process Units, ancillary equipment, and Fuel Gas Systems connected to the Flare for each Covered Flare.	Section 3.0 Appendix B
127(b)	An assessment of whether discharges to Covered Flares from these Flaring Process Units, ancillary equipment and Fuel Gas Systems can be minimized or prevented during periods of Startup, Shutdown, or emergency releases. The Flare minimization assessment must (at a minimum) consider the items in Paragraphs 127.b.i-iii of the Consent Decree. The assessment must provide clear rationale in terms of costs (capital and annual operating), natural gas offset credits (if applicable), technical feasibility, secondary environmental impacts and safety considerations for the selected minimization alternative(s) or a statement, with justifications, that flow reduction could not be achieved. Based upon the assessment, Settling Defendants shall identify the minimization alternatives that they have implemented by the due date of the Flare Management Plan and shall include a schedule for the prompt implementation of any selected measures that cannot reasonably be completed as of that date.	Section 6.0 Section 7.0
127(b)(i)	Modification in Startup and Shutdown procedures to reduce the quantity of process gas discharge to the Flare.	Section 6.2
127(b)(ii)	Plan and schedule for conducting acoustic monitoring on all hydrocarbon PRVs directed to a Covered Flare that are not identified in Appendix C - 2.2, as required by Paragraph 116 of the Consent Decree.	Section 7.2
127(b)(iii)	Installation of a FGRS, or, for facilities that are Fuel Gas rich, a FGRS and a co-generation unit or combined heat and power unit.	Section 2.0 Section 6.0
127(c)	A description of each Covered Flare containing the following information:	Section 2.0
127(c)(i)	A general description of the Covered Flare, including whether it is a ground Flare or elevated (including height), the type of assist system (e.g., air, steam, pressure, nonassisted), whether the Flare is used on a routine basis or if it is only used during periods of Startup, Shutdown or emergency release, and whether the Flare is equipped with a FGRS.	Section 2.0
127(c)(ii)	The smokeless capacity of the Covered Flare based on design conditions. Note: a single value must be provided for the smokeless capacity of the Flare.	Section 2.0
127(c)(iii)	The maximum Vent Gas flow rate (hydraulic load capacity).	Section 2.0
127(c)(iv)	The maximum Supplemental Gas flow rate.	Section 2.0
127(c)(v)	For Covered Flares that receive Assist Steam, the Minimum Total Steam Rate and the maximum Total Steam rate.	Section 2.0
127(c)(vi)	For Covered Flares that receive Assist Air, an indication of whether the fan/blower is single speed, multi-fixed speed (e.g., high, medium, and low speeds), or variable speeds. For fans/blowers with fixed speeds, provide the estimated Assist Air flow rate at each fixed speed. For variable speeds, provide the design fan curve (e.g., air flow rate as a function of power input).	Section 2.0
127(c)(vii)	Simple process flow diagram showing the locations of the Covered Flare following components of the Flare: Flare tip	Appendix B
127(c)(vii)	Flare tip date installed, manufacturer, nominal and effective tip diameter	Section 2.0
127(c)(vii)	Flare tip drawing	Confidential - Available Onsite

Citation	Consent Decree Requirement	Location
127(c)(vii)	Simple process flow diagram showing the locations of the Covered Flare following components of the Flare: knockout or surge drum(s) or pot(s)	Appendix B
127(c)(vii)	Knockout or surge drum(s) or pot(s)' dimensions and design capacities	Section 2.0
127(c)(vii)	Simple process flow diagram showing the locations of the Covered Flare following components of the Flare: Flare header(s) and subheader(s)	Appendix B
127(c)(vii)	Simple process flow diagram showing the locations of the Covered Flare following components of the Flare: assist system	Appendix B
127(c)(vii)	Simple process flow diagram showing the locations of the Covered Flare following components of the Flare: ignition system.	Appendix B
127(d)	Description and simple process flow diagram showing all gas lines (including Waste Gas, Purge Gas or Sweep Gas (as applicable) Supplemental Gas) that are associated with the Covered Flare.	Appendix B
127(d)	For Purge, Sweep, and Supplemental Gas, identify the type of gas used. Designate which lines are exempt from composition or Net Heating Value monitoring and why (e.g., natural gas, gas streams that have been demonstrated to have consistent composition, Pilot Gas). Designate which lines are monitored and	Appendix B
127(d)	Identify on the process flow diagram the location and type of each monitor.	Appendix B
127(d)	Designate the pressure relief devices that are vented to the Flare.	Section 4.0
127(e)	For each flow rate, gas composition, Net Heating Value calorimeter or hydrogen concentration monitor identified in Paragraph 127.d of the Consent Decree, provide a detailed description of the manufacturer's specifications, including, but not limited to, make, model, type, range, precision, accuracy, calibration, maintenance and quality assurance procedures.	Section 2.0
127(f)	For each pressure relief valve vented to the Covered Flare identified in Paragraphs 127.d of the Consent Decree, provide a detailed description of each pressure release valve, including type of relief device (rupture disc, valve type) diameter of the relief valve, set pressure of the relief valve and listing of the Prevention Measures implemented. This information may be maintained in an electronic database on-site and does not need to be submitted as part of the Flare Management Plan unless requested to do so by EPA and the Applicable State Co-Plaintiff.	Section 4.0
127(g)	Procedures to minimize or eliminate discharges to the Flare during the planned Startup and Shutdown of the refinery Flaring Process Units and ancillary equipment that are connected to the Covered Flare, together with a schedule for the prompt implementation of any procedures that cannot reasonably be implemented as of the date of the submission of the Flare Management Plan.	Section 6.0
127(h)	Waste Gas Characterization and Mapping. Settling Defendants shall assess the Waste Gas being disposed of at each Covered Flare subject to this requirement as set forth in Appendix C - 2.1 and determine its characteristics as follows:	Appendix B

Citation	Consent Decree Requirement	Location
127(h)(i)	<p>Volumetric (in scfd) Flow Rate. Settling Defendants shall identify the volumetric flow of Waste Gas, in scfm on a 30-day Rolling Average vented to each Covered Flare subject to this requirement as set forth in Appendix C - 2.1 between December 1, 2015, and November 30, 2016. To the extent that, for any particular Covered Flare, Settling Defendants have instrumentation capable of measuring the volumetric flow rate of hydrogen, nitrogen, oxygen, carbon monoxide, carbon dioxide, and/or steam in the Waste Gas, Settling Defendants may break down the volumetric flow as between: (i) all Waste Gas flows excluding hydrogen, nitrogen, oxygen, carbon monoxide, carbon dioxide, and/or water (steam); and (ii) hydrogen, nitrogen, oxygen, carbon monoxide, carbon dioxide, and/or water (steam) flows in the Waste Gas. Settling Defendants may use either an engineering evaluation or measurements from monitoring or a combination to determine flow rate. In determining flow rate, flows during all periods (including but not limited to normal operations and periods of Startup, Shutdown, Malfunction, process upsets, relief valve leakages, power losses due to an interruptible power service agreement, and emergencies arising from events within the boundaries of each of the Covered Refineries), except those described in the next sentence, shall be included. Flows that could not be prevented through reasonable planning and are caused by a natural disaster, act of war or terrorism, or External Power Loss are the only flows that shall be excluded from the calculation of flow rate.</p>	Section 5.1.1
127(h)(i)	<p>Settling Defendants shall specifically describe the date, time, and nature of the event that results in the exclusion of any flows from the calculation.</p>	Section 5.1.1
127(h)(ii)	<p>Baseload Waste Gas Flow Rates. Settling Defendants shall utilize flow rate data to determine the Baseload Waste Gas Flow Rate, in scfd, to each Covered Flare subject to this requirement as set forth in Appendix C - 2.1. The Baseload Waste Gas Flow Rate shall not include flows during periods of Startup, Shutdown, and Malfunction. The Baseload Waste Gas Flow Rate shall be based on the period between December 1, 2015, and November 30, 2016.</p>	Section 5.1.2
127(h)(iii)	<p>Identification of Constituent Gases. For each Covered Flare subject to this requirement as set forth in Appendix C - 2.1, Settling Defendants shall use best efforts to identify the constituent gases within the Waste Gas and the typical range of constituent concentrations during baseload conditions. Settling Defendants may use either an engineering evaluation or measurements from monitoring or a combination to determine Waste Gas constituents.</p>	Section 5.1.3
127(h)(iv)	<p>Waste Gas Mapping. Using instrumentation, isotopic tracing, and/or engineering calculations, Settling Defendants shall identify and estimate the flow from each Flaring Process Unit Flare header to the main Flare header(s) for each Covered Flare subject to this requirement as set forth in Appendix C - 2.1. Using that information and all other available information, Settling Defendants shall complete an identification of each Waste Gas tie-in to the main Flare header(s) and Flaring Process Unit Flare header(s), as applicable, consistent with Appendix C - 1.11. Temporary connections to a Flare's header(s) and/or subheader(s) are not required to be included in the mapping.</p>	Appendix B
127(i)	<p>Taking a Covered Flare out of Service. Settling Defendants shall identify any Covered Flare that it intends to take out of service, including the date for completion of the decommissioning. Taking a Covered Flare "out of service" means physically removing piping in Flare header or physically isolating the piping with a welded blind so as to eliminate direct piping to the Covered Flare.</p>	Section 9.0

Citation	Consent Decree Requirement	Location
127(j)	Prevention Measures. Settling Defendants shall describe and evaluate all Prevention Measures, including a schedule for the expeditious implementation and commencement of operation of all Prevention Measures, to address the following:	Section 6.0
127(j)(i)	Flaring that has occurred or may reasonably be expected to occur during planned maintenance activities, including Startup and Shutdown. The evaluation shall include a review of flaring that has occurred during these activities in the past three years and shall consider the feasibility of performing these activities without flaring.	Section 6.3
127(j)(ii)	Flaring that may reasonably be expected to occur due to issues of gas quantity and quality. The evaluation shall include an audit of the flare gas recovery capacity of each Covered Flare subject to this requirement as set forth in Appendix C - 2.1, the capacity including internal piping systems and the amine treating capacity available for Waste Gases including any limitations associated with the amine treating of Waste Gases for use as fuel. The evaluation shall consider the feasibility of reducing flaring through the recovery, treatment, and use of the Waste Gas.	Section 6.4
127(j)(iii)	Flaring caused by the recurrent failure of air pollution control equipment, process equipment, or a process to operate in a normal or usual manner. The evaluation shall consider the adequacy of existing maintenance schedules and protocols for such equipment. A failure is "recurrent" if it occurs more than twice during any five year period as a result of the same root cause.	Section 6.5
128	Updated Flare Management Plans. On the date specified in Appendix C - 2.1 and annually thereafter, Settling Defendants shall submit to EPA and the Applicable State Co- Plaintiff an Updated FMP, which shall update for the preceding calendar year, if and as necessary, the information required in Paragraphs 127.a-127.j and shall also include the following:	Appendix A
128(a)	Reductions Based on Root Cause Analysis. Settling Defendants shall review all of the Root Cause Analysis reports prepared pursuant to 40 C.F.R. Part 60, Subpart Ja or this Consent Decree to determine if reductions in addition to the reductions achieved through any corrective action can be realized; and	Section 8.0
128(b)	Revised Schedule. To the extent that Settling Defendants propose to extend any schedule set forth in the Initial FMP, Settling Defendants shall do so only with good cause.	Future FMP Update